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ABSTRACT

Described is a project to develop child-based measurement scales for assessing the achievement of handicapped children (birth to 8 years old) served by the Handicapped Children's Early Education Program (HCEEP) projects. In the first section, steps involved in the development of the Children's Early Education Developmental Inventory (CEEDI) are discussed which include identification of domains to be measured (such as communication and cognition); development of item pool; selection of milestones (such as locomotion, exploration, and expression of feelings); development of items (with alternate items for various severe handicapping conditions); development of the administration manual and test kit; and development of scoring rationale. In a section on the psychometric properties of the CEEDI, tables on the quantitative assessments of the validity and reliability of each scale are provided. The next three sections address the tasks of verifying handicapping conditions of the 160 children selected from 32 HCEEP projects to be assessed with the CEEDI; follow-up of 95 HCEEP "graduates"; and determination of parental involvement and satisfaction with HCEEP programs. In a summary of overall impact analyses, it is concluded that there is a positive HCEEP program impact in the personal-social, adaptive, cognitive, and communication domains; and that in the motor domain, results are too mixed to state a positive program impact. (SB)

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# A SUMMARY OF THE EVALUATION OF THE HANDICAPPED CHILDREN'S EARLY EDUCATION PROGRAM (HCEEP)

Presented by

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to the

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## INTRODUCTION

In endeavors to develop a national commitment to "full, equal educational opportunity for every handicapped child", the Bureau of Education for the Handicapped by means of the Education of the Handicapped Act (P.L. 92-230), Part C, has funded a variety of preschool projects designed to meet the educational needs of young handicapped children, ages birth to 8.* These programs provide educational and therapeutic services to children, parent participation activities, evaluation and research, and manpower training. Approximately 6,000 children identified as mentally retarded, hard of hearing, deaf, speech impaired, visually handicapped, emotionally disturbed, crippled, other health impaired, and multihandicapped, are served in about 152 programs funded for FY 1974-75 through the HCEEP. HCEEP projects are expected to include the following components: parent participation in the planning, development and operation of the projects; coordination with local public schools; coordination with community agencies; therapeutic and educational services to enrolled children; and dissemination and replication of effective programs and educational techniques. Though programs funded under the HCEEP must develop procedures for evaluating project efforts, there has been little basis for BEH to conduct a comprehensive across-project evaluation of the efficacy of the program as a whole. The study described in the following pages was designed to provide a firm procedural and data base for evaluation of preschool education for the handicapped which should be of similar value in improving program design and impact.

### Objectives and Scope

The overall objectives of the study were twofold:

(1) To conduct an evaluation of the impact of the Handicapped Children's Early Education Program

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* Martin, Edwin W., "Bureau of Education for the Handicapped Commitment and Program in Early Childhood Education, Exceptional Children, pp. 661-663; and U.S. Department of Health, Education, and Welfare, "Program Description: Handicapped Children's Early Education Program", Public Law 91-230, Part C, Title VI, Washington, D.C., October 25, 1971.

(HCEEP) in carrying out its objective of meeting the educational needs of young (0-8 years) handicapped children.

(2) To develop plans for a monitoring and reporting system to facilitate the evaluation of HCEEP effectiveness on a continuing basis.

The first objective entailed the construction and application of child-based measurement scales for purposes of determining the impact of the Program in terms of enhancing the progress, growth, and skills of children participating in the program. In addition to the child-based measures of progress, instruments and procedures were developed to obtain information concerning project-based measures of effectiveness. Data were collected on the extent and effectiveness of parental involvement in projects, and the number of "graduates" of HCEEP programs that are enrolled in appropriate school or preschool programs, and the adequacy of their functioning in these programs.

The second objective entailed the review of data collection experiences for purposes of modifying and refining the procedures, instruments, forms, etc., to be included in the project monitoring and reporting system. This system, when implemented, will enable the U.S. Office of Education (USOE) to continually monitor and evaluate on an overall basis the progress of various categories of handicapped children in various HCEEP projects and types of projects. The system was designed to enable HCEEP project directors to efficiently collect follow-up data on children who have left their programs, in order to obtain improved evaluation of their individual projects.

This paper consists of six sections. The first two deal with the development and psychometric characteristics of the Children's Early Education Developmental Inventory (CEEDI). This state-of-the-art instrument was developed to obtain child-based measures across HCEEP projects. The next three sections address the tasks of verifying handicapping conditions of the 160 children selected from 32 projects to be assessed with

the CEEDI; follow-up of 95 HCEEP "graduates"; and determination of parental involvement and satisfaction with HCEEP programs. Finally, the impact of the HCEEP projects will be reported for selected variables.

# DEVELOPMENT OF THE CHILDREN'S EARLY EDUCATION DEVELOPMENTAL INVENTORY (CEEDI)

## INTRODUCTION

The purpose of this task was to develop child-based measurement scales for assessing the achievement of children served by the HCEEP projects. More specifically, a measurement procedure was to be designed which would be utilized in evaluating the effectiveness of the HCEEP Program.

The child-based measurement procedures were designed to satisfy several key constraints. First, the scales were designed in a way that maximized, to the extent possible, their applicability across various handicapping conditions and across the wide diversity of early childhood development projects sponsored by the HCEEP program. A second key consideration centered around designing the scales so that, to the extent possible, progress of the handicapped children would be measured in terms of gains made toward the acquisition of skills characterizing the development of normal children. A third constraint posed for the child-based measure was to design the measurement scale in a way which would not penalize children because of the unique aspects of their handicapping conditions. Another constraint had to do with selection of items which reflect change in growth during the project year, even for severely handicapped children. Satisfying this constraint required the use of a basal age concept in establishing a base line of performance for each child. Another important constraint involved the design of standardized procedures for administering the measurement scales. One aspect of this constraint had to do with designing directions for those who use the instruments, i.e., outside examiners and teachers. The directions must be precise, yet clear and understandable. Also, there was a need to specify what the examiner or observer should know about the various conditions of the handicapped children to administer the instruments correctly and to accurately score the results.

The development of the CEEDI scales, in attempting to satisfy the above constraints, was based on the concept of milestones. Briefly stated, this concept implies that the normal pattern of child development follows a sequence in the attainment of skills, with each skill generally dependent for its development upon the successful acquisition of the one preceding it. The concept has several implications for scale design. First, it makes possible the use of "scale steps" reflecting levels of performance which a child must acquire before he can proceed further in his development. Each of the series of scale steps is based on an expected performance level consistent with the functioning of normal children.

## METHOD

The method utilized in producing the Children's Early Education Developmental Inventory (CEEDI) includes pre-development activities to familiarize the team with existing early childhood assessment tools, and the performance of seven steps described below.

Prior to the actual development of the child-based measure, the Battelle team sought to familiarize themselves with evaluation instruments and procedures used by the HCEEP projects. Recommendations of candidate HCEEP projects that had developed such instruments and techniques were obtained from the BEH and TADS. Subsequently, six projects were selected, and site visits were made. During the site visits, information was obtained on specific instruments used, how they were developed, the use to which they were put, methods and conditions of administration, adaptations made for handicapped children, etc. This information was related to the already generated specifications for developing the child-based measure. In addition to providing input for specifications and background information on the then current state-of-the-art in early childhood evaluation, the on-site visits yielded several instruments and techniques that were subsequently utilized, to some extent, in the development of the child-based measure.

The development of the child-based measure occurred during the performance of seven major interrelated steps. The steps are:

(1) Identification of Domains to be Measured
(2) Development of Item Pool
(3) Selection of Milestones
(4) Development of Items for Child-Based Measure
(5) Development of Administration Manual
(6) Development of Scoring Rationale
(7) Development of Validity and Reliability Rationale.

The following section briefly describes the activities associated with each of the seven steps.

(1) Identification of Domains to be Measured. Prior to as well as during the development of the item pool, the domains to be measured were considered. At this stage of development, five domains were tentatively selected as areas of measurement. They were communication, cognition, personal-social, adaptive, and motor skills. The domains later became the five scales in the CEEDI.

Consideration was also given to subdomains or subdimensions which made up each of the domains. Tentative definitions of each domain/subdomain were generated to provide guidelines in selection and appropriate placement. The subdomains and their definitions were periodically reviewed for revision.

(2) Development of Item Pool. The initial activity in this step was to identify and select sources of items. Since the child-based measure was to reflect the current state-of-the-art, items were selected from comprehensive instruments (standardized and non-standardized) that are commonly used for measuring critical skills in early childhood (birth through age eight). While most of the source instruments were designed primarily for use with non-handicapped children, some were for evaluation of children with specific handicaps. Thus, two item pools were generated, with items designed for non-handicapped children representing the majority of the items. Table 1 presents a bibliography of test sources utilized in the development of the scales.

TABLE 1

- Bayley Scales of Infant Development
- Concept Assessment Kit-Conservation (Goldschmid & Bentler)
- Carolina Developmental Profile
- Denver Developmental Screening Test
- Developmental Guidelines (Edgewood I.S.D.)
- Developmental Profile (Alpern & Boll)
- Developmental Test of Visual-Motor Integration (Beery)
- Gesell Developmental Schedules
- Inventory of Developmental Tasks (Santa Clara S.D.)
- Kohn & Silverman Competence Rating Scale for Preschool Children
- Learning Accomplishment Profile
- Manual for Assessing Social Abilities of One-to-Six-Year-Old Children (White & Watts)
- Manual for Testing Language Ability (White & Watts)
- Marshalltown Project Behavioral Prescription Guide
- Measurement of Intelligence of Infants and Young Children (Cattell)
- MEMPHIS Comprehensive Developmental Scale
- Merrill-Palmer Test Materials
- Oseretsky Test of Motor Proficiency
- Peabody Individual Achievement Test
- Physical Education for Elementary School Children (Kirchner)
- Portage Project Checklist
- Preschool Attainment Record
- Santa Clara Unified School District Inventory of Social Development
- Sequenced Inventory of Language Development
- Stanford-Binet Intelligence Scale
- Valett Developmental Survey of Basic Learning Abilities
- Vineland Social Maturity Scale
- Wechsler Intelligence Scale for Children
- Wide Range Achievement Test.

Approximately 4,000 items from source tests were analyzed in the effort to develop the item pool. Each item was transferred onto individual cards along with information on age norms; domain/subdomain placement by source test; administration procedures; reliability, validity, and scoring information. The use of cards allowed for subsequent grouping and re-grouping of items.

In many instances, the same behaviors were measured on a number of different source tests; therefore, the items measuring the same skills were clustered together, and a label name was applied. From the clustering of the many items by the behavior measured, behaviors were sequenced from birth through eight years of age to portray the functioning of normal children at certain periods of their development.* Eleven age categories were utilized, with a six-month span during the first two years and a one-year span after two years of age.

(3) Selection of Milestones. To identify the "milestones" from the comprehensive list of behaviors generated from the test scores, each cluster within each of the five domains was subjected to review and analysis by a group of experts in the area of child growth and development. The clusters of behaviors were rated in terms of their criticality or importance to the development of the child. Criteria used in making judgments concerning the criticality of a behavior were as follows: (1) the importance of the behavior to the child's development toward normal functioning in life, (2) the degree of support by professional knowledge and literature of the behavior as a milestone in early development, (3) the amount of acceptance among educational practitioners as a critical skill or behavior for the child to possess or acquire, and (4) the degree to which the behavior is amenable to educational intervention and instruction. Subsequent to the identification of milestones from

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* At this stage, sequencing of item clusters by age resulted in only a crude, tentative listing. This was because of the considerable variation in age placement of similar items from different source tests. That is, one behavior may have been placed in such diverse categories as 4-6.5 months, 3-7 months, and 6-8 months. In the final placement in the CEEDI, reliability and validity information from source tests was utilized to determine "best" age placement.

those behaviors measured on existing test instruments, gaps were identified where milestones were missing. Additional sources (i.e., research) were consulted and the missing milestones obtained.

The critical behaviors, or milestones, were next organized within the five major areas of development into smaller units or "subdomains", e.g., perceptual discrimination, attention, etc. (The subdomains in each domain area are listed below.) The subdomains were delineated to make it possible for the user of the instrument to collect information useful for determining how well children are developing in specific areas of growth. In addition, each milestone was judged regarding handicapping conditions for which modifications in administration or alternate items would be necessary.

TABLE 2

- Motor
  - -- Muscle control
  - -- Body coordination
  - -- Locomotion
  - -- Perceptual motor
  - -- Fine muscle
- Cognitive
  - -- Exploration
  - -- Perceptual discrimination
  - -- Memory
  - -- Conceptual development
  - -- Classification
  - -- Conservation
  - -- Reasoning
  - -- Academic skills
- Communication
  - -- Receptive: Discrimination
  - -- Receptive: Meaning
  - -- Expressive: Sounds
  - -- Expressive: Grammar/rules
  - -- Expressive: Meaning/usage

- Personal-Social
  - -- Self-concept
  - -- Social role
  - -- Expression of feelings/affect
  - -- Coping
  - -- Moral development
  - -- Sensitivity in social relationships
  - -- Adult interaction
  - -- Peer interaction
- Adaptive
  - -- Self-help: Feeding
  - -- Self-help: Personal toiletry
  - -- Self-help: Dressing
  - -- Attention
  - -- Personal responsibility
  - -- Task-related skills.

(4) Development of Items. After the identification of the first list of milestone behaviors within the five domains, items were then developed which would assess these behaviors in the best way possible. For each item in the five Scales (with the exception of the Personal-Social Scale), a Standard Administration Procedure and Considerations for the Handicapped were developed.* The following page illustrates the format of each item. The Standard Administration Procedure specified the behavior being assessed, materials needed, procedure for the administration of the item and the criteria for a credited response. For many handicapped children, especially those manifesting some developmental lag or retardation, the standard administration of the items is appropriate and will provide the needed assessment information, i.e., status in terms of normal development, and specific strengths and weaknesses.

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* Most items from the Personal-Social Scale have no Considerations for the Handicapped since the Observation and Parental Report procedures for administration are used.

## STANDARD ADMINISTRATION PROCEDURES

DOMAIN:
SUBDOMAIN:

AGE RANGE:

ITEM NO.

BEHAVIOR:

MATERIALS NEEDED:

PROCEDURE:

SCORING:

## CONSIDERATIONS FOR THE HANDICAPPED

BEHAVIOR:

ITEM NO.

SEVERE MOTOR IMPAIRMENT – LOWER BODY AND GENERAL MUSCULATURE:

SEVERE MOTOR IMPAIRMENT – ARM/HAND:

SEVERE VISUAL IMPAIRMENT:

SEVERE HEARING IMPAIRMENT OR EMOTIONAL DISTURBANCE:

SEVERE SPEECH IMPAIRMENT:

Wherever necessary and possible, special considerations and modifications for children having various severe handicapping conditions were developed. These special considerations and variations were used in administering the standard procedure and/or scoring. The five handicapping conditions for which special considerations and modifications are provided are as follows:

- Severe Motor Impairment of the Lower Body and General Musculature: this includes major motor problems throughout large muscle systems of the body (with the exception of the arms and hands) or where the handicap primarily involves only the legs and feet.
- Severe Motor Impairment in the Arms and Hands: this includes difficulty in using arms, arms and hands, or just hands.
- Severe Visual Impairment: this includes legal blindness and severe visual handicaps.
- Severe Hearing Impairment: this includes severe hearing impairment with an accompanying major difficulty with language.
- Severely Speech Impaired: this includes difficulty with expressive speech.

In some cases an Alternate Item was developed. The Alternate Item attempts to measure a behavior similar to that assessed in the standard item in those cases where a handicapping condition makes it impossible to elicit the desired behavior in the manner prescribed in the standard procedure. An Alternate Item was developed in only those cases where there was a very good possibility that the behavior or skill, because of a handicap, could not be displayed in response to the standard procedure. Almost all of the Alternative Items provided in the child-

based measure were developed for the Cognitive Scale because of the nature of the behaviors being assessed on this domain, e.g., concept, reasoning, memory, etc.

The following three pages illustrate the Standard Administration Procedure, Considerations for the Handicapped, and an Alternate Item for one item from the Cognitive Scale.

For each behavior measured in the scale, careful consideration was given to the best means of obtaining the desired information. Three different procedural methods were developed to obtain information regarding the child's ability to perform the behavior specified in the item. These procedures are: Structured, Observation, and Parental Report. The three types of procedures are utilized to provide the administrator the best possible means for assessing the specified behaviors. For any one item, one or some combination of the procedures were suggested for use in collecting the required information.

The Structured procedure requires that the desired information be obtained in a controlled setting in which materials are manipulated or stimuli are provided by the administrator in order to elicit the desired response from the child. The Structured procedure is most commonly administered to one child; however, in some cases use of this procedure with a small group of children is appropriate.

The Observation procedure is utilized for behaviors that are best assessed in a natural setting such as that of the normal ongoing activities of the classroom or the home. The criteria for credit in many of these items require that the behavior be demonstrated not just once, but consistently when presented with the appropriate situation or stimulus conditions. In these cases, the use of observation over a period of time in given situations by the administrator was selected as the best means to measure performance.

In those cases where the behavior in question could not be assessed in a structured setting by the administrator, or when the administrator would not have an opportunity to observe the behavior during normal contacts with the child, the Parental Report procedure was used. In the Parental Report

STANDARD ADMINISTRATION PROCEDURES

| DOMAIN: COGNITIVE<br>SUBDOMAIN: Classification | AGE RANGE: 2 to 3 yrs<br>(24 through 35 mos) | ITEM NO.<br>Cg 18 |
|---|---|---|

**BEHAVIOR:** The child identifies familiar objects by their use.

**MATERIALS NEEDED:**

CUP
SHOE
SPOON
BAR OF SOAP
BALL

**PROCEDURE:**

STRUCTURED. Place the five objects on the table in front of the child in the following order: cup, shoe, spoon, soap and ball. Say, SEE ALL OF THESE THINGS? DO YOU KNOW WHAT THEY ARE? CAN YOU NAME THEM FOR ME? If the child does not name all five of the objects, name them for him. Then say:

1) SHOW ME (or GIVE ME) THE ONE YOU PUT ON YOUR FEET.
2) SHOW ME (or GIVE ME) THE ONE YOU EAT WITH.
3) SHOW ME (or GIVE ME) THE ONE YOU DRINK OUT OF.
4) SHOW ME (or GIVE ME) THE ONE YOU CAN THROW.
5) SHOW ME (or GIVE ME) THE ONE YOU WASH YOUR FACE WITH.

If the child responds by giving the administrator the object, replace it on the table before making the next request. Allow 1 trial only for each question.

**SCORING:**

Credit is given if the child identifies 4 of the 5 objects correctly.

## CONSIDERATIONS FOR THE HANDICAPPED

BEHAVIOR: The child identifies familiar objects by their use.

ITEM NO. Cg 18

**SEVERE MOTOR IMPAIRMENT – LOWER BODY AND GENERAL MUSCULATURE:**

**SEVERE MOTOR IMPAIRMENT – ARM/HAND:**

If the child has difficulty indicating his response by pointing to an object, have him push it. If he still has difficulty, the administrator may ask the standard question in the following manner: WHICH ONE DO YOU PUT ON YOUR FEET? After asking the question, point to each of the objects on the table and ask for each THIS ONE? (even if the child responds yes to one). Continue asking the child THIS ONE? (pointing to each of the five objects). The child receives credit if he responds "yes" to the correct object and only the correct object.

**SEVERE VISUAL IMPAIRMENT:**

As each of the five objects are presented and named, allow the child to handle the object. Ask the child to "give" you the object rather than pointing to it. Repeat the question several times as the child searches for the correct object.

**SEVERE HEARING IMPAIRMENT OR EMOTIONAL DISTURBANCE:**

* This item may be inappropriate for some children with severe hearing impairment or emotional disturbance. If so, use ALTERNATE ITEM 18.1.

**SEVERE SPEECH IMPAIRMENT:**

ALTERNATE ITEM
STANDARD ADMINISTRATION PROCEDURES

| DOMAIN: COGNITIVE<br>SUBDOMAIN: Classification | AGE RANGE: 2 to 3 yrs<br>(24 through 35 mos) | ITEM NO.<br>Cg 18.1 |
|---|---|---|

**BEHAVIOR:** The child gives the use of common objects.

**MATERIALS NEEDED:**

OBJECTS: CUP, SHOE, SPOON, BAR OF SOAP, AND A BALL

PRACTICE ITEMS: HAT AND A PENCIL

**PROCEDURE:**

STRUCTURED. Place the seven objects on the table in front of the child in a random order. Call the child's attention to the objects by pointing to each individually. Then pick up the hat and point to it saying, THIS GOES ON YOUR HEAD. Then point to your head and place the hat on top of your head. Do this several times and then give the hat to the child and gesture for him to put it where it belongs. Replace the hat on the table and pick up the pencil. Point to the pencil and then pantomime writing with it, saying YOU WRITE WITH THIS. Do this several times and then give the pencil to the child to do the same. Do not proceed with the other five objects until the child has voluntarily demonstrated the use of the hat and the pencil, repeating the demonstrations if necessary.

Give the child the following objects from the table and combine the verbal instructions with gestures to indicate to the child that he is to tell you or show you what you do with the object.

1) Hand the child the CUP and say, SHOW ME WHAT YOU DO WITH THIS.
2) Hand the child the SHOE and say, SHOW ME WHAT YOU DO WITH THIS.
3) Hand the child the SPOON and say, SHOW ME WHAT YOU DO WITH THIS.
4) Hand the child the SOAP and say, SHOW ME WHAT YOU DO WITH THIS.
5) Hand the child the BALL and say, SHOW ME WHAT YOU DO WITH THIS.

**SCORING:** Credit is given if the child demonstrates the appropriate use for 4 of the 5 objects using gestures or pantomiming. Examples of acceptable responses:

1) drinks out of it, puts it up to his or administrator's mouth, or equivalent
2) puts it on his foot, points to his foot, or equivalent
3) puts it in his mouth, puts it in the administrator's mouth, or equivalent
4) points to his face or hands, rubs it in his hands, or equivalent
5) rolls it, throws it, bounces it, or equivalent (not just dropping it).

procedure, specific questions concerning the child's behavior are directed to the parent, or parents, of the child. The parent is asked to report on the child's behavior under the given conditions and is, in most cases, asked to indicate the frequency of occurrence of the behavior in the given situation. The Observation procedure differs from the Parental Report procedure in that the administrator makes the direct observations of the child in the former during the course of his contact with the child in the program. In the Parental Report method, the parent is asked to supply information about the child based on his knowledge and recollection of the child's typical behavior in given situations. In a sense, it is more of an historical report than a direct observation.

Following the writing of test items, the items were sequenced by age for each domain. Information obtained from a review of validity and reliability data of source tests as well as research findings was utilized in final placement decisions.

The end result of Step 4 was a sequence of 362 test items which assessed child growth and development in five domains with the following separately bound Scales: Motor, Cognitive, Communication, Personal-Social, and Adaptive. The distribution of items by age and Scale is presented in Table 3.

(5) Development of Administration Manual and Test Kit. Following the development of test items, the administration manual was written and a kit was assembled. The manual presented the development and purpose of the instrument, a description of the CEEDI, general procedures for administering the Scales, scoring procedure, and bibliography. Concurrently, a test kit was developed. This consisted of visual materials created by Battelle, and other objects, toys, etc., either made by Battelle or purchased. Some materials needed for the administration of the Scales are not provided in the kit, however, and must be obtained by the administrator or the program staff. The decision to have the preschool staff obtain some of the needed materials was made for several reasons. First, it was impractical to prepare and package all of the materials needed, since it would require a large and cumbersome package to manage. Second, the material has educational value for the child which exceeds its value in the testing situation. Therefore, most of the material should be available in the program to help the child make progress toward the attainment of the

TABLE 3. NUMBER AND DISTRIBUTION OF TEST ITEMS IN THE CHILDREN"S EARLY EDUCATION DEVELOPMENTAL INVENTORY (CEEDI), BY AGE AND DOMAIN

| | MOTOR | COGNITIVE | COMMUNICATION | PERSONAL-SOCIAL | ADAPTIVE | TOTAL |
|---|---|---|---|---|---|---|
| 0 to 5 mos. | 9 | 5 | 5 | 8 | 8 | 35 |
| 6 to 11 mos. | 11 | 3 | 5 | 4 | 8 | 31 |
| 1-0 to 1-5 yrs. | 10 | 1 | 4 | 5 | 3 | 23 |
| 1-6 to 1-11 yrs. | 4 | 5 | 2 | 3 | 5 | 19 |
| 2 to 3 yrs. | 10 | 5 | 7 | 14 | 10 | 46 |
| 3 to 4 yrs. | 7 | 7 | 10 | 9 | 7 | 40 |
| 4 to 5 yrs. | 8 | 7 | 8 | 10 | 5 | 38 |
| 5 to 6 yrs. | 7 | 9 | 3 | 15 | 8 | 42 |
| 6 to 7 yrs. | 7 | 7 | 4 | 7 | 6 | 31 |
| 7 to 8 yrs. | 8 | 7 | 5 | 8 | 4 | 32 |
| 8 to 9 yrs. | 7 | 6 | 3 | 5 | 4 | 25 |
| TOTAL | 88 | 62 | 56 | 88 | 68 | 362 |

milestone behaviors between testing periods. Finally, using readily available material makes it possible to recommend that parents obtain, or adapt materials or toys that they already have at home, to help the child make the necessary developmental progress. Also, if materials are lost, or, if additional items are needed of this type for instructional purposes, they can be obtained by the program staff with little difficulty.

A listing of all materials required and their sources (i.e., kit or test administrator) was included in each Scale manual.

(6) Development of Scoring Rationale. During the development of individual test items, the rationale for the scoring procedures was being formulated. It was determined for each of the five domains, a score would be determined, and that Basal and Ceiling Levels would be established.

Establishing Basal and Ceiling Levels

Due to the large number of items in each of the five Scales, administration of all items for each child would consume too much time. Also, even the most superficial familiarity with the child, e.g., knowing his age, would make the perfunctory administration of many items a useless expenditure of time. Consequently, certain procedures should be followed which will preclude the administration of those items which contain behaviors that the child has obviously attained and surpassed and/or those which he obviously has yet to attain.

Within each Scale, in general, an item which falls within the age category immediately below the age of the child should be administered first. If there is additional knowledge of the child which indicates that starting with an item in a higher or lower age category would be desirable, the starting point should be adjusted accordingly. If the child passes the item selected for the starting point, the next highest item should then be given. This should be continued until the child fails to pass an item. If the child has passed at least three consecutive items in a row, the item just below the one he failed to pass defines his Basal Level. If the child has not passed at least three consecutive items in a row, the

administrator should give the item just below the starting point item and continue backward until the child has passed three consecutive items in a row. The highest item in this sequence of passes defines his Basal Level. If the child fails to pass the starting point item, the administrator should select a second starting point item in the next lowest age category and proceed exactly in the manner described above.

Once the Basal Level has been established, items should be administered until the child fails to pass at least three consecutive items in a row, i.e., continually higher consecutive items should be given until this sequence occurs. The highest item passed before this sequence occurs defines the Ceiling Level. If during the establishment of the Basal Level the child once or more failed to pass at least three items in a row, the highest item passed before the lowest such sequence defines the Ceiling Level.

Due to the allowable variations between and within the item administration procedures, viz., Structured, Observation, and Parental Report, this method of establishing Basal and Ceiling Levels will not normally proceed as smoothly as it can be described. The necessity of scheduling time for administrating items employing Structured procedures and for meeting with parents for items employing the Parental Report will not always be consistent with the timing for completing Observation items.

The procedure described above is to be followed. Items should be administered in their proper sequence for which administration is possible, reasonable, and/or desirable at that time* until the child passes three items in a row, but not necessarily in strict sequence. The number of the highest item in this sequence defines the child's probable Basal Level. The actual Basal Level must be determined at a later time when the items passed over have been administered. The same strategy should be used to establish the probable Ceiling Level. That is, the number of the highest item that the child passes before he fails to pass three consecutive items in a row, for which administration is possible, reasonable, and/or desirable, stands as the probable Ceiling until the items skipped have been administered.

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* Testing is most likely to be broken up into segments based upon using the same administration procedure (Structured, Observation, or Parental Report).

Scoring Individual Items

The procedure for scoring individual items was designed to be as simple as possible without losing important remarks or qualifications about the child's responses. Each item is scored as a "Passed" or "Not Passed" if it is administered to the child. The criteria for passing are stated in the Scale. If an item is omitted for reasons other than its being outside of the range between the Basal and Ceiling Levels, or, if the child refuses to respond, the item is to be scored as a "Not Passed". However, provision is made on the scoring sheet (illustrated in Exhibit 5) for each Scale (in the "Other" column) to indicate omissions (O) and refusals (R). Provision is also made for indicating if the "Considerations For the Handicapped" or an Alternate Item was used. Space is provided for each item for remarks or notes which the administrator feels are relevant to determining whether the child should receive a "Passed" or "Not Passed" and, perhaps more importantly, remarks which are deemed relevant to judging the validity of the item for assessing the child's behavioral development.

For the most part, the scoring sheet is the same for each of the five Scales with the exception that the number of items varies. The first column identifies the item by its sequence number. The second column indicates the age category to which the item belongs. The third column indicates the procedure options and preferences, S = Structured, O = Observation, P = Parental Report. If there is no preferred procedure among two or three procedures, a slash (/) is placed between the equivalent procedures. If there is a preferred procedure(s) the most preferred is noted first and then is separated by a hyphen from the less preferred. For example, "S-O/P" means a Structured procedure is preferred to either Observation or Parental Report and the latter two are considered equivalent. The letters "O-P" indicate that the item cannot be given using a Structured procedure and that Observation is preferred to Parental Report. The fourth column contains a short verbal description of the item. The fifth, sixth, and seventh columns are for checking "Passed", "Not Passed", or "Other". "Other is checked if the item is omitted (indicate with O), or refused (indicate with R). The next two columns are to be checked if the item

was modified through Considerations for the Handicapped, or replaced by an Alternate Item, respectively. The last column is for any relevant remarks either for the administrator's use or for commenting on the item's validity. An example scoring sheet is presented in the following page.

Obtaining Domain Scale Scores

After all necessary items have been administered to the child in any one of the five Scales, the Scale score is calculated. This is done by following three steps:

(1) Note the sequence number of the Basal Level item.

(2) Count the number of items passed beyond the Basal Level.

(3) Add the number of items passed beyond the Basal Level to the sequence number of the Basal Level item.

The number resulting from these steps is the child's Scale score for that domain.

Due to the experimental nature of these Scales, only two interpretations of a child's score are recommended at this time. First, the higher the score is, the greater the child's development is within a domain. If one were to compare one child's score at two points in time, i.e., his progress, or two or more children's scores at the same point in time, larger differences in domain scores probably would indicate larger differences in development. However, for good reasons, any comparisons of changes or differences in domain scores should be done with great caution. Second, the value of a child's score may be identified with the age category of the item bearing that sequence number. For example, if a child's Communication score is 43 and item Cm43 falls in the 5-6 age category, the child's Communication development may be interpreted as falling in that age category.

C E E D I
THE CHILDREN'S EARLY EDUCATION DEVELOPMENTAL INVENTORY
SCORING SHEET - COMMUNICATION SCALE

| ITEM NO. | AGE CATEGORY | PRO-CEDURE | ITEM DESCRIPTION | SCORING: P | NP | O | H | A | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| Cm 1 | 0-6 mos | S | Responds to voice | | | | | | |
| Cm 2 | 0-6 mos | S | Responds to non-speech sound | | | | | | |
| Cm 3 | 0-6 mos | O | Produces sounds: vowel | | | | | | |
| Cm 4 | 0-6 mos | O | Produces sounds: consonant-vowel | | | | | | |
| Cm 5 | 0-6 mos | S | Locates source of sound | | | | | | |
| Cm 6 | 6-12 mos | O | Vocalizes sounds | | | | | | |
| Cm 7 | 6-12 mos | O | Repeats 1 or more syllables | | | | | | |
| Cm 8 | 6-12 mos | S-O | Responds to familiar words | | | | | | |
| Cm 9 | 6-12 mos | S-P | Imitates speech sounds | | | | | | |
| Cm 10 | 6-12 mos | S-P | Discriminates voice intonation | | | | | | |
| Cm 11 | 12-18 mos | S | Responds to gestures and requests | | | | | | |
| Cm 12 | 12-18 mos | O-P | Uses gestures | | | | | | |
| Cm 13 | 12-18 mos | O-P | Uses variations in voice | | | | | | |
| Cm 14 | 12-18 mos | S/O | Uses 10 or more words | | | | | | |
| Cm 15 | 18-24 mos | S-O | Initiates speech/gestures about object | | | | | | |
| Cm 16 | 18-24 mos | S | Follows 3 or more instructions | | | | | | |
| Cm 17 | 2-3 yrs | S | Understands possessives | | | | | | |
| Cm 18 | 2-3 yrs | O | Uses pronouns I, you and me | | | | | | |
| Cm 19 | 2-3 yrs | O | Uses 2 words meaningfully | | | | | | |
| Cm 20 | 2-3 yrs | S | Understands 4 or more prepositions | | | | | | |
| Cm 21 | 2-3 yrs | S | Responds with yes/no appropriately | | | | | | |
| Cm 22 | 2-3 yrs | O | Uses 3 word phrases meaningfully | | | | | | |
| Cm 23 | 2-3 yrs | O | Labels his own creations | | | | | | |
| Cm 24 | 3-4 yrs | S | Uses articles "the" and "a" | | | | | | |
| Cm 25 | 3-4 yrs | S | Discriminates word pronunciation | | | | | | |
| Cm 26 | 3-4 yrs | O | Uses irregular past tense | | | | | | |
| Cm 27 | 3-4 yrs | S | Understands plurals | | | | | | |
| Cm 28 | 3-4 yrs | S | Follows 2-step commands | | | | | | |
| Cm 29 | 3-4 yrs | S | Forms "ed" past tense | | | | | | |
| Cm 30 | 3-4 yrs | S | Understands "biggest" and "longest" | | | | | | |
| Cm 31 | 3-4 yrs | S | Forms "s" plurals | | | | | | |
| Cm 32 | 3-4 yrs | O | Asks "what/where/how/who/why" questions | | | | | | |
| Cm 33 | 3-4 yrs | O | Relates experiences to others | | | | | | |

Legend: P=Passes, NP=Not Passed, O=Other (R=Refused, O=Omitted); H Modified through CONSIDERATIONS FOR THE HANDICAPPED, A=Use of ALTERNATE ITEM

The second interpretation is considered important due to the varying number of items from one domain to another. If any diagnostic value is to be gained from the scores, it would be to point out the domains in which the child is strong or weak relative to normal development. By making the number of items passed equivalent to the item which represents the same number in the normal developmental sequence, the relative developmental position of the child's score can be obtained. After all five scores have been so interpreted, diagnostic comparisons can be made.

(7) Develop Validity and Reliability Rationale. Several procedures were followed to increase the probability that the child-based measure would yield a high degree of validity and reliability. Specifically, careful attention was given to selecting items that measured dimensions of the five domains, placing items in the appropriate sequence and age category, and developing administration procedures that were sufficiently structured to obtain consistent measures. The selection of items is discussed earlier under Steps 1 and 2. To structure and facilitate this activity, considerable attention was given to comprehensively defining the domains/subdomains and ensuring that each subdomain was represented across age categories.* The subdomains were defined prior to development of the item pool and were periodically reviewed to determine the need for revision. Finally, all items were subjected to a rating by the test development team to arrive at a consensus regarding subdomain category.

A second procedure utilized to increase validity and reliability of the child-based instrument was related to age placement of behaviors. The technical manual of source tests, where they existed, were reviewed to evaluate age norm data for each source test to aid in developing guidelines for assigning the milestone behaviors to appropriate age levels. The age

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* Obviously, some subdomains (i.e., academic skills) could not or should not be included in all age categories from birth through eight years of age.

norm data for essentially the same behaviors that was included as different items in multiple source tests were compared and analyzed to determine the age level at which the behavior might be most appropriately placed.* In cases where source tests varied considerably on age placement, the standardization procedures and data,** to the extent they were available, were consulted. In some cases task analyses, previous research, and medically-based data were utilized. This procedure allowed, at a minimum, a judgment that placed a behavior at the beginning, middle, or end of any one age category.

The discrepancy on age placement of a behavior was resolved in many cases through examination of related behaviors in a domain/subdomain. For example, there is an established sequence of behaviors that precede thumb-forefinger opposition. While various tests may place steps of the progression at different ages, it is still possible to sequence the behaviors. Generally, the age placement of at least one behavior in the sequence could be anchored in normative data. Thus, age levels of preceding behaviors could be placed relative to the anchored behavior.

Finally, the probability of increasing validity and reliability of the child-based measure was improved by detailing procedures by which the instrument was administered. For each test item, specific behaviors, materials, procedures (including verbal instructions, use of demonstration, etc.) and criterion for scoring were written. Providing instructions in

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* Not all source tests anchored behaviors (items) to age levels. In addition, some tests did not adequately define an age level; i.e., because of the lack of a manual, it was difficult to determine if a "two-year old" level meant the task was thought to most likely occur at 1.5 to 2 years (within the second year of life), or after the second birthday was reached (the third year of life). This resulted in disregarding the age attached when there was no definition. The behavior itself was still included, however, to assist in defining milestones of development.

** That is, population characteristics, proportion of subjects passing each item, etc.

such detail increased the probability that reliable results would be obtained in a test-retest situation or if several test administrators assessed the same child. Further, the administration manual accompanying the five Scales detailed the background and intended use of the instrument, and specific procedures associated with administering and scoring the CEEDI. For persons who would not have extensive experience in assessing children, general considerations in testing children are also presented.

The procedures to ensure high reliability and validity appear to have yielded the desired results. Analysis of the pre- and posttest data indicates a reliability coefficient of .80 to .90 for each of the five Scales. The following section presents a further discussion of these and other CEEDI technical characteristics.

## PSYCHOMETRIC PROPERTIES OF THE CEEDI

This discussion presents technical information concerning the evaluation of the psychometric properties of the CEEDI, the set of five developmental scales developed for the measurement of child progress or growth in the evaluation of the HCEEP projects. As stated earlier, the CEEDI is an experimental set of measures of developmental level in five domains: Personal-Social, Adaptive, Cognitive, Communication, and Motor. The information presented concerns quantitative assessments of the validity and reliability of each scale using both pretest and posttest data separately.

### Scale Validity

First to be considered is the issue of whether, and to what extent, the five CEEDI domain scales measure what they were intended to measure. The scope of the evaluation study, stated earlier, precluded any structured effort to obtain a broad spectrum of validation data. However, within the sample of children tested with the CEEDI, one significant aspect of the validity of each scale was examined: the relationship of the scales' total raw scores and the percent passing the items within each scale with the age of the children. The CEEDI scales were designed to be measures of developmental level and, as such, the items were ordered as well as possible so that the probability of their being passed should decrease from the first to the last item for children of any given age level. In addition, the probability of each item's being passed should increase across increasing age levels. Consequently the raw scores should increase with age, reflecting development.

Before presenting the data concerned with the scales' relationship with age, a brief description the method of obtaining the raw scores should be repeated. Based upon the chronological age of the child being tested (and any other relevant information) the test administrator chose an item, somewhere in the scale, as a starting point. Then successively lower items were given until the child passed three items in a row. The

sequence number of the highest item of these three that the child had passed in order was designated as his basal score. Next the child was administered successively higher items until he failed to pass three items in a row. The sequence number of the highest item that the child had passed was designated as his ceiling score. The raw domain scale score was the basal score plus the number of items passed until the ceiling had been reached. Consequently, the raw score presupposes that the child would have passed all items below the basal score and would have failed to pass all items above the ceiling score. These two presuppositions are assumed to be valid in the analyses of the total and item scores employed to provide information on the validity (and reliability) of each scale.

Next the age validity of items will be considered. The percents of children passing each item (the item difficulties) for children of increasing age were calculated for each domain on pre- and posttest. Tables 4, 5, and 6, included as examples, contain data on pretest performance for the personal-social, adaptive, and motor domains. In each domain, there is a strong trend of increasing item difficulty from the first to the last item in the scale. Also, for most items here is a strong trend of decreasing item difficulty from low to high age levels. Some of these items show a smooth trend and others contain one large increase in percent passing between adjacent age levels.

The information on item difficulties by age level presented is, of course, based upon relatively small samples of children who were sampled from a special population. However, this information could be used in a larger validation and standardization study of the CEEDI to weed out or change the sequence of certain items.

The age validity of total scores will be considered now. The relationship of total scores with age (in months) is consistently very strong and linear for each domain and for both pretest and posttest. Table 7 shows the linear correlations between scores and age. They range from approximately 0.68 to 0.81. Indeed one can conclude that each scale demonstrates the expected relation to age.

TABLE 4. PERCENT OF CHILDREN PASSING EACH ITEM FROM THE PERSONAL-SOCIAL DOMAIN OF THE CEEDI PRETEST BY AGE LEVEL[a]

| Item | Age Level 0-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 | 6-7 |
|---|---|---|---|---|---|---|---|
| N[b] | 4 | 9 | 18 | 36 | 47 | 32 | 6 |
| PS01 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| PS02 | 100.0 | 88.9 | 88.9 | 100.0 | 100.0 | 100.0 | 100.0 |
| PS03 | 75.0 | 100.0 | 88.9 | 100.0 | 100.0 | 100.0 | 100.0 |
| PS04 | 50.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| PS05 | 75.0 | 88.9 | 88.9 | 100.0 | 100.0 | 100.0 | 100.0 |
| PS06 | 75.0 | 77.8 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| PS07 | 25.0 | 77.8 | 88.9 | 100.0 | 100.0 | 100.0 | 100.0 |
| PS08 | 50.0 | 88.9 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| PS09 | 25.0 | 66.7 | 94.4 | 100.0 | 97.9 | 100.0 | 100.0 |
| PS10 | 25.0 | 77.8 | 88.9 | 100.0 | 95.7 | 100.0 | 100.0 |
| PS11 | 50.0 | 55.6 | 83.3 | 100.0 | 97.9 | 100.0 | 100.0 |
| PS12 | 25.0 | 66.7 | 100.0 | 100.0 | 97.9 | 100.0 | 100.0 |
| PS13 | 25.0 | 44.4 | 83.3 | 97.2 | 95.7 | 100.0 | 100.0 |
| PS14 | 50.0 | 77.8 | 94.4 | 100.0 | 95.7 | 100.0 | 100.0 |
| PS15 | 25.0 | 55.6 | 72.2 | 100.0 | 93.6 | 100.0 | 100.0 |
| PS16 | 0 | 22.2 | 72.2 | 100.0 | 89.4 | 100.0 | 100.0 |
| PS17 | 0 | 44.4 | 77.8 | 100.0 | 93.6 | 100.0 | 100.0 |
| PS18 | 0 | 11.1 | 83.3 | 97.2 | 89.4 | 100.0 | 100.0 |
| PS19 | 0 | 22.2 | 77.8 | 97.2 | 95.7 | 100.0 | 100.0 |
| PS20 | 0 | 11.1 | 88.9 | 94.4 | 95.7 | 96.9 | 100.0 |
| PS21 | 0 | 11.1 | 55.6 | 91.7 | 89.4 | 96.9 | 100.0 |
| PS22 | 0 | 0 | 38.9 | 88.9 | 83.0 | 96.9 | 100.0 |
| PS23 | 0 | 0 | 72.2 | 94.4 | 91.5 | 96.9 | 100.0 |
| PS24 | 0 | 11.1 | 83.3 | 97.2 | 91.5 | 100.0 | 100.0 |
| PS25 | 0 | 11.1 | 61.1 | 86.1 | 91.5 | 96.9 | 100.0 |
| PS26 | 0 | 0 | 50.0 | 88.9 | 76.6 | 100.0 | 100.0 |
| PS27 | 0 | 11.1 | 44.4 | 86.1 | 93.6 | 100.0 | 100.0 |
| PS28 | 0 | 0 | 11.1 | 66.7 | 72.3 | 96.9 | 100.0 |
| PS29 | 0 | 0 | 16.7 | 38.9 | 59.6 | 96.9 | 100.0 |
| PS30 | 0 | 11.1 | 50.0 | 58.3 | 78.7 | 93.8 | 100.0 |
| PS31 | 0 | 0 | 22.2 | 52.8 | 76.6 | 90.6 | 83.3 |
| PS32 | 0 | 0 | 33.3 | 63.9 | 78.7 | 93.8 | 100.0 |
| PS33 | 0 | 0 | 50.0 | 69.4 | 85.1 | 93.8 | 83.3 |
| PS34 | 0 | 0 | 22.2 | 63.9 | 66.0 | 93.8 | 100.0 |
| PS35 | 0 | 0 | 16.7 | 69.4 | 78.7 | 96.9 | 100.0 |
| PS36 | 0 | 0 | 16.7 | 47.2 | 63.8 | 87.5 | 100.0 |
| PS37 | 0 | 0 | 16.7 | 36.1 | 51.1 | 87.5 | 83.3 |
| PS38 | 0 | 0 | 11.1 | 47.2 | 63.8 | 84.4 | 83.3 |
| PS39 | 0 | 0 | 05.6 | 30.6 | 51.1 | 90.6 | 100.0 |

(a) Age levels are to interpreted as "at least..., but less than...", e.g., 2-3 means "at least 2, but less than 3 years old".

(b) Number of children taking all items by age level

TABLE 4. PERCENT OF CHILDREN PASSING EACH ITEM FROM THE PERSONAL-SOCIAL DOMAIN OF THE CEEDI PRETEST BY AGE LEVEL[a] (CONTINUED)

| Item | Age Level 0-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 | 6-7 |
|---|---|---|---|---|---|---|---|
| N[b] | 4 | 9 | 18 | 36 | 47 | 32 | 6 |
| PS40 | 0 | 0 | 0 | 47.2 | 57.4 | 93.8 | 100.0 |
| PS41 | 0 | 0 | 0 | 11.1 | 23.4 | 78.1 | 83.3 |
| PS42 | 0 | 0 | 11.1 | 38.9 | 51.1 | 87.5 | 100.0 |
| PS43 | 0 | 0 | 11.1 | 36.1 | 40.4 | 75.0 | 83.3 |
| PS44 | 0 | 0 | 11.1 | 41.7 | 57.4 | 93.8 | 83.3 |
| PS45 | 0 | 0 | 11.1 | 25.0 | 42.6 | 81.3 | 100.0 |
| PS46 | 0 | 0 | 05.6 | 25.0 | 34.0 | 65.6 | 83.3 |
| PS47 | 0 | 0 | 0 | 27.8 | 46.8 | 71.9 | 100.0 |
| PS48 | 0 | 0 | 05.6 | 22.2 | 48.9 | 81.3 | 66.7 |
| PS49 | 0 | 0 | 05.6 | 19.4 | 46.8 | 62.5 | 100.0 |
| PS50 | 0 | 0 | 05.6 | 05.6 | 14.9 | 50.0 | 50.0 |
| PS51 | 0 | 0 | 05.6 | 11.1 | 34.0 | 53.1 | 50.0 |
| PS52 | 0 | 0 | 0 | 05.6 | 34.0 | 59.4 | 83.3 |
| PS53 | 0 | 0 | 05.6 | 16.7 | 40.4 | 62.5 | 100.0 |
| PS54 | 0 | 0 | 05.6 | 05.6 | 25.5 | 46.9 | 66.7 |
| PS55 | 0 | 0 | 05.6 | 11.1 | 38.3 | 62.5 | 83.3 |
| PS56 | 0 | 0 | 0 | 05.6 | 19.1 | 34.4 | 50.0 |
| PS57 | 0 | 0 | 05.6 | 11.1 | 36.2 | 65.6 | 100.0 |
| PS58 | 0 | 0 | 0 | 11.1 | 38.3 | 62.5 | 83.3 |
| PS59 | 0 | 0 | 0 | 08.3 | 29.8 | 59.4 | 83.3 |
| PS60 | 0 | 0 | 0 | 08.3 | 29.8 | 53.1 | 83.3 |
| PS61 | 0 | 0 | 0 | 02.8 | 12.8 | 18.8 | 83.3 |
| PS62 | 0 | 0 | 0 | 05.6 | 27.7 | 50.0 | 100.0 |
| PS63 | 0 | 0 | 0 | 02.8 | 14.9 | 12.5 | 66.7 |
| PS64 | 0 | 0 | 0 | 05.6 | 12.8 | 28.1 | 83.3 |
| PS65 | 0 | 0 | 0 | 05.6 | 19.1 | 34.4 | 83.3 |
| PS66 | 0 | 0 | 0 | 02.8 | 14.9 | 12.5 | 16.7 |
| PS67 | 0 | 0 | 0 | 08.3 | 06.4 | 15.6 | 50.0 |
| PS68 | 0 | 0 | 0 | 08.3 | 17.0 | 37.5 | 66.7 |
| PS69 | 0 | 0 | 0 | 05.6 | 14.9 | 25.0 | 50.0 |
| PS70 | 0 | 0 | 0 | 08.3 | 12.8 | 21.9 | 33.3 |
| PS71 | 0 | 0 | 0 | 05.6 | 21.3 | 15.6 | 83.3 |
| PS72 | 0 | 0 | 0 | 02.8 | 12.8 | 18.8 | 66.7 |
| PS73 | 0 | 0 | 0 | 08.3 | 06.4 | 21.9 | 66.7 |
| PS74 | 0 | 0 | 0 | 08.3 | 17.0 | 21.9 | 66.7 |
| PS75 | 0 | 0 | 0 | 08.3 | 19.1 | 28.1 | 66.7 |
| PS76 | 0 | 0 | 0 | 02.8 | 08.5 | 09.4 | 50.0 |
| PS77 | 0 | 0 | 0 | 05.6 | 04.3 | 09.4 | 50.0 |
| PS78 | 0 | 0 | 0 | 02.8 | 10.6 | 12.5 | 33.3 |
| PS79 | 0 | 0 | 0 | 02.8 | 06.4 | 03.1 | 16.7 |

(a) Age levels are to interpreted as "at least..., but less than...", e.g., 2-3 means "at least 2, but less than 3 years old".

(b) Number of children taking all items by age level

TABLE 4. PERCENT OF CHILDREN PASSING EACH ITEM FROM THE PERSONAL-SOCIAL DOMAIN OF THE CEEDI PRETEST BY AGE LEVEL[a] (CONTINUED)

| Item | Age Level 0-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 | 6-7 |
|---|---|---|---|---|---|---|---|
| N[b] | 4 | 9 | 18 | 36 | 47 | 32 | 6 |
| PS80 | 0 | 0 | 0 | 05.6 | 06.4 | 12.5 | 33.3 |
| PS81 | 0 | 0 | 0 | 02.8 | 08.5 | 03.1 | 16.7 |
| PS82 | 0 | 0 | 0 | 02.8 | 04.3 | 03.1 | 33.3 |
| PS83 | 0 | 0 | 0 | 0 | 04.3 | 06.3 | 0 |
| PS84 | 0 | 0 | 0 | 02.8 | 06.4 | 09.4 | 33.3 |
| PS85 | 0 | 0 | 0 | 02.8 | 04.3 | 06.3 | 33.3 |
| PS86 | 0 | 0 | 0 | 02.8 | 0 | 0 | 16.7 |
| PS87 | 0 | 0 | 0 | 02.8 | 04.3 | 03.1 | 33.3 |

(a) Age levels are to interpreted as "at least..., but less than...", e.g., 2-3 means "at least 2, but less than 3 years old".

(b) Number of children taking all items by age level

TABLE 5. PERCENT OF CHILDREN PASSING EACH ITEM FROM THE ADAPTIVE DOMAIN OF THE CEEDI PRETEST BY AGE LEVEL [a]

| Item | Age Level 0-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 | 6-7 |
|---|---|---|---|---|---|---|---|
| N[b] | 4 | 9 | 18 | 36 | 47 | 32 | 6 |
| AD01 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| AD02 | 75.0 | 77.8 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| AD03 | 75.0 | 77.8 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| AD04 | 75.0 | 77.8 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| AD05 | 100.0 | 88.9 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| AD06 | 75.0 | 77.8 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| AD07 | 100.0 | 88.9 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| AD08 | 75.0 | 88.9 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| AD09 | 50.0 | 66.7 | 94.4 | 100.0 | 97.9 | 100.0 | 100.0 |
| AD10 | 75.0 | 88.9 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| AD11 | 75.0 | 88.9 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| AD12 | 25.0 | 66.7 | 94.4 | 100.0 | 95.7 | 100.0 | 100.0 |
| AD13 | 75.0 | 88.9 | 94.4 | 100.0 | 95.7 | 100.0 | 100.0 |
| AD14 | 25.0 | 66.7 | 94.4 | 100.0 | 97.9 | 100.0 | 100.0 |
| AD15 | 25.0 | 55.6 | 88.9 | 100.0 | 97.9 | 100.0 | 100.0 |
| AD16 | 0 | 33.3 | 88.9 | 100.0 | 95.7 | 100.0 | 100.0 |
| AD17 | 0 | 22.2 | 94.4 | 100.0 | 93.6 | 100.0 | 100.0 |
| AD18 | 0 | 55.6 | 77.8 | 100.0 | 97.9 | 96.9 | 100.0 |
| AD19 | 25.0 | 44.4 | 88.9 | 100.0 | 95.7 | 100.0 | 100.0 |
| AD20 | 25.0 | 22.2 | 77.8 | 100.0 | 93.6 | 96.9 | 100.0 |
| AD21 | 0 | 33.3 | 94.4 | 97.2 | 97.9 | 100.0 | 100.0 |
| AD22 | 0 | 33.3 | 83.3 | 94.4 | 95.7 | 93.8 | 100.0 |
| AD23 | 0 | 33.3 | 72.2 | 97.2 | 93.6 | 96.9 | 100.0 |
| AD24 | 0 | 22.2 | 88.9 | 94.4 | 95.7 | 90.6 | 100.0 |
| AD25 | 0 | 33.3 | 83.3 | 97.2 | 95.7 | 96.9 | 100.0 |
| AD26 | 0 | 0 | 27.8 | 94.4 | 91.5 | 93.8 | 100.0 |
| AD27 | 0 | 0 | 22.2 | 94.4 | 85.1 | 93.8 | 100.0 |
| AD28 | 0 | 0 | 72.2 | 100.0 | 91.5 | 100.0 | 100.0 |
| AD29 | 0 | 0 | 66.7 | 97.2 | 91.5 | 93.8 | 100.0 |
| AD30 | 0 | 0 | 22.2 | 83.3 | 89.4 | 93.8 | 100.0 |
| AD31 | 0 | 0 | 38.9 | 72.2 | 85.1 | 93.8 | 100.0 |
| AD32 | 0 | 0 | 11.1 | 72.2 | 85.1 | 93.8 | 100.0 |
| AD33 | 0 | 0 | 05.6 | 47.2 | 68.1 | 90.6 | 100.0 |
| AD34 | 0 | 0 | 27.8 | 75.0 | 78.7 | 93.8 | 100.0 |
| AD35 | 0 | 0 | 11.1 | 58.3 | 78.7 | 90.6 | 100.0 |
| AD36 | 0 | 0 | 16.7 | 58.3 | 78.7 | 93.8 | 100.0 |
| AD37 | 0 | 0 | 27.8 | 77.8 | 83.0 | 90.6 | 100.0 |
| AD38 | 0 | 0 | 11.1 | 69.4 | 83.0 | 93.8 | 100.0 |
| AD39 | 0 | 0 | 16.7 | 61.1 | 70.2 | 84.4 | 100.0 |

(a) Age levels are to interpreted as "at least..., but less than...", e.g., 2-3 means "at least 2, but less than 3 years old".

(b) Number of children taking all items by age level

TABLE 5. PERCENT OF CHILDREN PASSING EACH ITEM FROM THE ADAPTIVE DOMAIN OF THE CEEDI PRETEST BY AGE LEVEL[a] (CONTINUED)

| Item | Age Level 0-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 | 6-7 |
|---|---|---|---|---|---|---|---|
| N[b] | 4 | 9 | 18 | 36 | 47 | 32 | 6 |
| AD40 | 0 | 0 | 11.1 | 44.4 | 68.1 | 87.5 | 100.0 |
| AD41 | 0 | 0 | 11.1 | 80.6 | 83.0 | 93.8 | 100.0 |
| AD42 | 0 | 0 | 11.1 | 58.3 | 68.1 | 84.4 | 100.0 |
| AD43 | 0 | 0 | 05.6 | 41.7 | 66.0 | 87.5 | 100.0 |
| AD44 | 0 | 0 | 11.1 | 25.0 | 48.9 | 65.6 | 100.0 |
| AD45 | 0 | 0 | 0 | 38.9 | 40.4 | 56.3 | 100.0 |
| AD46 | 0 | 0 | 0 | 13.9 | 17.0 | 31.3 | 50.0 |
| AD47 | 0 | 0 | 05.6 | 16.7 | 44.7 | 68.8 | 100.0 |
| AD48 | 0 | 0 | 0 | 16.7 | 29.8 | 46.9 | 83.3 |
| AD49 | 0 | 0 | 0 | 05.6 | 12.8 | 34.4 | 33.3 |
| AD50 | 0 | 0 | 0 | 16.7 | 23.4 | 53.1 | 66.7 |
| AD51 | 0 | 0 | 0 | 11.1 | 17.0 | 46.9 | 83.3 |
| AD52 | 0 | 0 | 0 | 08.3 | 27.7 | 46.9 | 83.3 |
| AD53 | 0 | 0 | 0 | 08.3 | 17.0 | 34.4 | 83.3 |
| AD54 | 0 | 0 | 0 | 11.1 | 19.1 | 31.3 | 83.3 |
| AD55 | 0 | 0 | 0 | 11.1 | 19.1 | 43.8 | 83.3 |
| AD56 | 0 | 0 | 0 | 0 | 02.1 | 18.8 | 33.3 |
| AD57 | 0 | 0 | 0 | 02.8 | 10.6 | 15.6 | 66.7 |
| AD58 | 0 | 0 | 0 | 08.3 | 10.6 | 21.9 | 50.0 |
| AD59 | 0 | 0 | 0 | 02.8 | 0 | 03.1 | 0 |
| AD60 | 0 | 0 | 0 | 05.6 | 06.4 | 18.8 | 50.0 |
| AD61 | 0 | 0 | 0 | 05.6 | 06.4 | 12.5 | 66.7 |
| AD62 | 0 | 0 | 0 | 0 | 02.1 | 09.4 | 0 |
| AD63 | 0 | 0 | 0 | 0 | 02.1 | 03.1 | 16.7 |
| AD64 | 0 | 0 | 0 | 02.8 | 02.1 | 12.5 | 33.3 |
| AD65 | 0 | 0 | 0 | 0 | 0 | 0 | 33.3 |
| AD66 | 0 | 0 | 0 | 0 | 0 | 0 | 33.3 |
| AD67 | 0 | 0 | 0 | 0 | 0 | 03.1 | 50.0 |
| AD68 | 0 | 0 | 0 | 0 | 0 | 0 | 16.7 |

(a) Age levels are to interpreted as "at least..., but less than...", e.g., 2-3 means "at least 2, but less than 3 years old".

(b) Number of children taking all items by age level

TABLE 6. PRECENT OF CHILDREN PASSING EACH ITEM FROM THE MOTOR DOMAIN OF THE CEEDI PRETEST BY AGE LEVEL[a]

| Item | Age Level 0-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 | 6-7 |
|---|---|---|---|---|---|---|---|
| N[b] | 4 | 9 | 18 | 36 | 47 | 32 | 6 |
| M001 | 100.0 | 88.9 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| M002 | 75.0 | 88.9 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| MC03 | 100.0 | 88.9 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| M004 | 100.0 | 100.0 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| M005 | 75.0 | 88.9 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| M006 | 75.0 | 77.8 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| M007 | 100.0 | 77.8 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| M008 | 100.0 | 100.0 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| M009 | 75.0 | 55.6 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| M010 | 75.0 | 55.6 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| M011 | 50.0 | 55.6 | 88.9 | 100.0 | 100.0 | 100.0 | 100.0 |
| M012 | 0 | 55.6 | 88.9 | 100.0 | 100.0 | 100.0 | 100.0 |
| M013 | 50.0 | 55.6 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| M014 | 50.0 | 44.4 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| M015 | 50.0 | 44.4 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| M016 | 25.0 | 44.4 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| M017 | 50.0 | 44.4 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| M018 | 25.0 | 33.3 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| M019 | 0 | 33.3 | 88.9 | 100.0 | 100.0 | 100.0 | 100.0 |
| M020 | 25.0 | 33.3 | 94.4 | 100.0 | 100.0 | 100.0 | 100.0 |
| M021 | 0 | 33.3 | 88.9 | 100.0 | 97.9 | 100.0 | 100.0 |
| M022 | 25.0 | 22.2 | 88.9 | 100.0 | 100.0 | 100.0 | 100.0 |
| M023 | 0 | 11.1 | 88.9 | 100.0 | 97.9 | 100.0 | 100.0 |
| M024 | 0 | 22.2 | 83.3 | 100.0 | 97.9 | 100.0 | 100.0 |
| M025 | 0 | 22.2 | 88.9 | 100.0 | 97.9 | 100.0 | 100.0 |
| M026 | 0 | 33.3 | 88.9 | 100.0 | 97.9 | 100.0 | 100.0 |
| M027 | 0 | 22.2 | 83.3 | 94.4 | 97.9 | 96.9 | 100.0 |
| M028 | 0 | 22.2 | 83.3 | 97.2 | 97.9 | 96.9 | 100.0 |
| M029 | 0 | 22.2 | 77.8 | 97.2 | 95.7 | 96.9 | 100.0 |
| M030 | 0 | 0 | 77.8 | 94.4 | 97.9 | 93.8 | 100.0 |
| M031 | 0 | 11.1 | 83.3 | 94.4 | 95.7 | 96.9 | 100.0 |
| M032 | 0 | 22.2 | 83.3 | 97.2 | 95.7 | 93.8 | 100.0 |
| M033 | 0 | 11.1 | 77.8 | 94.4 | 97.9 | 96.9 | 100.0 |
| M034 | 0 | 0 | 50.0 | 94.4 | 93.6 | 96.9 | 100.0 |
| M035 | 0 | 0 | 50.0 | 88.9 | 87.2 | 93.8 | 100.0 |
| M036 | 0 | 0 | 44.4 | 94.4 | 95.7 | 93.8 | 100.0 |
| M037 | 0 | 0 | 38.9 | 83.3 | 87.2 | 93.8 | 100.0 |
| M038 | 0 | 11.1 | 50.0 | 80.6 | 87.2 | 93.8 | 100.0 |
| M039 | 0 | 0 | 66.7 | 91.7 | 93.6 | 93.8 | 100.0 |

(a) Age levels are to interpreted as "at least..., but less than...", e.g., 2-3 means "at least 2, but less than 3 years old".

(b) Number of children taking all items by age level

TABLE 6. PERCENT OF CHILDREN PASSING EACH ITEM FROM THE MOTOR DOMAIN OF THE CEEDI PRETEST BY AGE LEVEL[a] (CONTINUED)

| Item | Age Level 0-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 | 6-7 |
|---|---|---|---|---|---|---|---|
| N[b] | 4 | 9 | 18 | 36 | 47 | 32 | 4 |
| M040 | 0 | 0 | 55.6 | 94.4 | 91.5 | 96.9 | 100.0 |
| M041 | 0 | 0 | 27.8 | 72.2 | 83.0 | 96.9 | 100.0 |
| M042 | 0 | 0 | 33.3 | 80.6 | 87.2 | 93.8 | 100.0 |
| M043 | 0 | 0 | 27.8 | 66.7 | 78.7 | 93.8 | 100.0 |
| M044 | 0 | 0 | 0 | 72.2 | 74.5 | 93.8 | 100.0 |
| M045 | 0 | 0 | 27.8 | 77.8 | 76.6 | 93.8 | 100.0 |
| M046 | 0 | 0 | 16.7 | 61.1 | 63.8 | 87.5 | 100.0 |
| M047 | 0 | 0 | 0 | 30.6 | 40.4 | 90.6 | 100.0 |
| M048 | 0 | 0 | 11.1 | 19.4 | 44.7 | 81.3 | 100.0 |
| M049 | 0 | 0 | 0 | 38.9 | 59.6 | 87.5 | 100.0 |
| M050 | 0 | 0 | 05.6 | 47.2 | 59.6 | 87.5 | 100.0 |
| M051 | 0 | 0 | 0 | 02.8 | 21.3 | 71.9 | 83.3 |
| M052 | 0 | 0 | 0 | 13.9 | 38.3 | 78.1 | 83.3 |
| M053 | 0 | 0 | 05.6 | 30.6 | 51.1 | 78.1 | 100.0 |
| M054 | 0 | 0 | 0 | 08.3 | 31.9 | 75.0 | 83.3 |
| M055 | 0 | 0 | 0 | 08.3 | 23.4 | 71.9 | 83.3 |
| M056 | 0 | 0 | 0 | 36.1 | 36.2 | 84.4 | 100.0 |
| M057 | 0 | 0 | 0 | 08.3 | 29.8 | 62.5 | 83.3 |
| M058 | 0 | 0 | 0 | 0 | 10.6 | 59.4 | 83.3 |
| M059 | 0 | 0 | 0 | 0 | 0 | 37.5 | 66.7 |
| M060 | 0 | 0 | 0 | 0 | 08.5 | 50.0 | 66.7 |
| M061 | 0 | 0 | 0 | 02.8 | 17.0 | 65.6 | 83.3 |
| M062 | 0 | 0 | 05.6 | 16.7 | 34.0 | 68.8 | 83.3 |
| M063 | 0 | 0 | 0 | 05.6 | 19.1 | 53.1 | 83.3 |
| M064 | 0 | 0 | 0 | 0 | 02.1 | 28.1 | 50.0 |
| M065 | 0 | 0 | 0 | 0 | 10.6 | 37.5 | 50.0 |
| M066 | 0 | 0 | 0 | 0 | 0 | 18.8 | 16.7 |
| M067 | 0 | 0 | 0 | 0 | 10.6 | 31.3 | 83.3 |
| M068 | 0 | 0 | 0 | 0 | 06.4 | 15.6 | 66.7 |
| M069 | 0 | 0 | 0 | 0 | 04.3 | 0 | 16.7 |
| M070 | 0 | 0 | 0 | 0 | 04.3 | 21.9 | 50.0 |
| M071 | 0 | 0 | 0 | 0 | 06.4 | 28.1 | 50.0 |
| M072 | 0 | 0 | 0 | 0 | 06.4 | 25.0 | 66.7 |
| M073 | 0 | 0 | 0 | 0 | 0 | 03.1 | 33.3 |
| M074 | 0 | 0 | 0 | 0 | 06.4 | 21.9 | 50.0 |
| M075 | 0 | 0 | 0 | 0 | 0 | 09.4 | 16.7 |
| M076 | 0 | 0 | 0 | 0 | 02.1 | 15.6 | 50.0 |
| M077 | 0 | 0 | 0 | 0 | 02.1 | 09.4 | 16.7 |
| M078 | 0 | 0 | 0 | 0 | 0 | 0 | 16.7 |
| M079 | 0 | 0 | 0 | 0 | 0 | 03.1 | 16.7 |

(a) Age levels are to interpreted as "at least..., but less than...", e.g., 2-3 means "at least 2, but less than 3 years old".

(b) Number of children taking all items by age level

TABLE 6. PERCENT OF CHILDREN PASSING EACH ITEM FROM THE MOTOR DOMAIN OF THE CEEDI PRETEST BY AGE LEVEL[a] (CONTINUED)

| Item | Age Level 0-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 | 6-7 |
|---|---|---|---|---|---|---|---|
| N[b] | 4 | 9 | 18 | 36 | 47 | 32 | 4 |
| MO80 | 0 | 0 | 0 | 0 | 0 | 0 | 16.7 |
| MO81 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MO82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MO83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MO84 | 0 | 0 | 0 | 0 | 0 | 0 | 16.7 |
| MO85 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MO86 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MO87 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MO88 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

(a) Age levels are to interpreted as "at least..., but less than...", e.g., 2-3 means "at least 2, but less than 3 years old".

(b) Number of children taking all items by age level

TABLE 7. CORRELATIONS BETWEEN CEEDI DOMAIN RAW SCORES AND AGE IN MONTHS FOR PRETEST AND POSTTEST

| Domain | Test Period | r | Sample Size |
|---|---|---|---|
| Personal-Social | Pretest | 0.700 | 130 |
| | Posttest | 0.720 | 129 |
| Adaptive | Pretest | 0.748 | 130 |
| | Posttest | 0.698 | 128 |
| Cognitive | Pretest | 0.732 | 130 |
| | Posttest | 0.705 | 130 |
| Communication | Pretest | 0.710 | 129 |
| | Posttest | 0.677 | 129 |
| Motor | Pretest | 0.809 | 130 |
| | Posttest | 0.750 | 130 |

Additional analyses were performed to study further the age-dependency for each scale. As might be expected, the basal and ceiling scores were highly correlated with age (correlations ranged between 0.64 and 0.78). It was also found that the number of items passed above the basal was not related to age or to the basal score (correlations ranged scores were found (a) not to be related to age (correlations between -0.18 and 0.10) and (b) to have the characteristically small negative correlations with pretest scores (correlations between -0.33 and -0.01).

Thus, the five CEEDI domain scales appear to be very valid measures of development to the extent that expected relationships with age are indicative of this validity.

Although the domain scales appear to be valid (and reliable, as will be shown later) measures of development, one should ask whether they indeed measure five separate domains or, at worst, are they all just measures of age. Although this question requires a more definitive evaluation study of the CEEDI, per se, than was possible within the scope of this project, an attempt to shed some light on this issue was made. Table 8 shows the correlations among scales for both the pretest and posttest. As can be seen, all correlations are quite high, ranging from 0.74 to 0.93.

In order to see if the different scales were, at worst, just measures of age, the first-order partial correlations among the domains, controlling for age in months, were calculated. Surprisingly, although age was highly correlated with each scale, these partial correlations remained moderately high. Table 9 shows that these partial correlations ranged from 0.49 to 0.86. Therefore, the five domain scales appear to be substantially related independent of their linear relationship with age. Whether or not these scales measure five separate domains or are just slightly different ways of measuring general development is not known. And, perhaps, this point may be irrelevant. Certainly, those persons and experts who selected, modified, and wrote the items for each scale would argue that different clusters of developmental behavior are being measured, but that growth in each domain seldom occurs without observing growth in the other four.

TABLE 8. CORRELATIONS AMONG THE FIVE CEEDI DOMAIN SCORES AT PRETESTING AND POSTTESTING

Pretest

| Domain | | PS | AD | CG | CM | MO |
|---|---|---|---|---|---|---|
| Personal-Social | (PS) | - | 0.756 | 0.749 | 0.774 | 0.776 |
| Adaptive | (AD) | | - | 0.798 | 0.767 | 0.894 |
| Cognitive | (CG) | | | - | 0.868 | 0.825 |
| Communication | (CM) | | | | - | 0.826 |
| Motor | (MO) | | | | | - |

Posttest

| Domain | | PS | AD | CG | CM | MO |
|---|---|---|---|---|---|---|
| Personal-Social | (PS) | - | 0.850 | 0.838 | 0.802 | 0.830 |
| Adaptive | (AD) | | - | 0.820 | 0.764 | 0.891 |
| Cognitive | (CG) | | | - | 0.929 | 0.871 |
| Communication | (CM) | | | | - | 0.832 |
| Motor | (MO) | | | | | - |

TABLE 9. PARTIAL CORRELATIONS, CONTROLLING FOR AGE IN MONTHS AMONG THE FIVE CEEDI DOMAIN SCORES AT PRETESTING AND POSTTESTING

Pretest

| Domain | | PS | AD | CG | CM | MO |
|---|---|---|---|---|---|---|
| Personal-Social | (PS) | - | 0.553 | 0.486 | 0.550 | 0.500 |
| Adaptive | (AD) | | - | 0.555 | 0.505 | 0.740 |
| Cognitive | (CG) | | | - | 0.726 | 0.581 |
| Communication | (CM) | | | | - | 0.607 |
| Motor | (MO) | | | | | - |

Posttest

| Domain | | PS | AD | CG | CM | MO |
|---|---|---|---|---|---|---|
| Personal-Social | (PS) | - | 0.699 | 0.671 | 0.616 | 0.631 |
| Adaptive | (AD) | | - | 0.642 | 0.552 | 0.775 |
| Cognitive | (CG) | | | - | 0.865 | 0.729 |
| Communication | (CM) | | | | - | 0.667 |
| Motor | (MO) | | | | | - |

## Scale Reliability

The evidence that was collected concerning the reliability of each scale appears overwhelmingly in support of the fact that the CEEDI domain scores are very reliable. For example, even though no test-retest coefficients were possible to calculate, the correlations between pre- and posttest scores were 0.79 for Personal-Social, 0.86 for Adaptive, 0.87 for Cognitive, 0.89 for Communication, and 0.93 for Motor. The time between pre- and posttesting was between 4 and 7 months and most children went 6 or 7 months between testings.

The principal method of estimating scale reliability was the calculation of Cronbach's Alpha. For each scale, either pre- or post-test, this estimate of internal consistency was at least equal to 0.97. Another measure of internal consistency that was calculated was the mean inter-item correlation. Across the five domains, for pre- and posttest data, these means ranged from 0.31 to 0.38. With such a large number of items in each scale (56 to 88), it is not difficult to see why Cronbach's Alpha was always so high.

As one more indication of internal consistency and, also, to provide more psychometric information about the scale items, item-total correlations were calculated for all items with non-zero variance. Table 10 shows the frequency distribution of these correlations by each domain for pretest and posttest. In every case, at least 60 percent of these correlations are 0.50 and above. And only 21 of the 666 item-total correlations were less than 0.20. The range was from 0.11 to 0.86.

TABLE 10. FREQUENCY DISTRIBUTIONS OF ITEM-TOTAL CORRELATIONS BY DOMAIN FOR PRETEST AND POSTTEST WITH ITEMS WITH ZERO VARIANCE EXCLUDED

Pretest

| Correlation Level | Personal-Social Number | Personal-Social Percent | Adaptive Number | Adaptive Percent | Cognitive Number | Cognitive Percent | Communication Number | Communication Percent | Motor Number | Motor Percent |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.10-0.19 | 0 | 0.0 | 3 | 4.5 | 1 | 2.0 | 0 | 0.0 | 4 | 4.9 |
| 0.20-0.29 | 7 | 8.1 | 6 | 9.0 | 3 | 5.9 | 3 | 5.6 | 6 | 7.4 |
| 0.30-0.39 | 9 | 10.5 | 8 | 11.9 | 6 | 11.8 | 8 | 14.8 | 6 | 7.4 |
| 0.40-0.49 | 13 | 15.1 | 8 | 11.9 | 7 | 13.7 | 8 | 14.8 | 8 | 9.9 |
| 0.50-0.59 | 15 | 17.4 | 13 | 19.4 | 5 | 9.8 | 6 | 11.1 | 12 | 14.8 |
| 0.60-0.69 | 17 | 19.8 | 13 | 19.4 | 12 | 23.5 | 3 | 5.6 | 24 | 29.6 |
| 0.70-0.79 | 25 | 29.1 | 16 | 23.9 | 17 | 33.3 | 16 | 29.6 | 21 | 25.9 |
| 0.80-0.89 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 10 | 18.5 | 0 | 0.0 |
| Totals | 86 | 100.0 | 67 | 100.0 | 51 | 100.0 | 54 | 100.0 | 81 | 99.9* |

Posttest

| Correlation Level | Personal-Social Number | Personal-Social Percent | Adaptive Number | Adaptive Percent | Cognitive Number | Cognitive Percent | Communication Number | Communication Percent | Motor Number | Motor Percent |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.10-0.19 | 2 | 2.5 | 0 | 0.0 | 6 | 11.1 | 5 | 9.4 | 0 | 0.0 |
| 0.20-0.29 | 3 | 3.8 | 4 | 6.7 | 1 | 1.8 | 3 | 5.7 | 4 | 4.9 |
| 0.30-0.39 | 5 | 6.3 | 7 | 11.7 | 6 | 11.1 | 5 | 9.4 | 8 | 9.9 |
| 0.40-0.49 | 9 | 11.4 | 9 | 15.0 | 6 | 11.1 | 6 | 11.3 | 10 | 12.4 |
| 0.50-0.59 | 11 | 13.9 | 7 | 11.7 | 3 | 5.6 | 3 | 5.7 | 17 | 21.0 |
| 0.60-0.69 | 18 | 22.8 | 16 | 26.7 | 6 | 11.1 | 4 | 7.6 | 23 | 28.4 |
| 0.70-0.79 | 30 | 38.0 | 16 | 26.7 | 20 | 37.0 | 10 | 18.9 | 19 | 23.4 |
| 0.80-0.89 | 1 | 1.3 | 1 | 1.7 | 6 | 11.1 | 17 | 32.1 | 0 | 0.0 |
| Totals | 79 | 100.0 | 60 | 100.2* | 54 | 99.9* | 53 | 100.1* | 81 | 100.0 |

* Percentages do not sum to 100 due to rounding errors.

## VERIFICATION OF HANDICAPPING CONDITION

The primary purpose of this task was to determine the handicapping condition(s) of each child selected for assessment with the CEEDI.* Further, this information provided a basis for an assessment of the specific needs these children have for program services. The task was accomplished through completion of a Battelle developed verification form by licensed and credentialled psychologists.

In addition to identifying information about the child (i.e., code number, age, sex, and date of enrollment in the project), the form required the following information:

(1) The primary and secondary handicapping conditions of each child, as judged by the psychologist on the basis of his/her contact with the child.

(2) The primary and secondary handicapping conditions of each child as judged by the project staff.

(3) Services other than educational which are judged by the psychologist to be needed by each child, and those being provided by the project or from other sources.

Four methods were to be followed by the psychologist in gathering data upon which to make his/her judgments. These methods are described below.

(1) Initially, the child's record folder was examined. Information from case histories, specialists' reports, results of recently administered tests, and records of services utilized was sought and recorded, as appropriate.

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* This task is distinctly different from that of the data collector whose task involved assessing the developmental level of each child.

(2) Second, the child was observed in the classroom and other settings, and notations on his skills and deficits were made. Observation for a total of at least one hour (broken into several smaller segments) was suggested.

(3) Third, the child was assessed using appropriate instruments, if the first two methods did not yield enough information upon which to make judgment of the handicapping condition. Although Battelle provided a list of suggested instruments that would be appropriate, each psychologist selected those to be used.

(4) Finally, the psychologist informally interviewed staff who were faimilar with the child and could provide reliable reports concerning service needs.

Based on the above steps, the psychologists made judgments and completed the form. Summaries of existing specialists reports and test results, circumstances surrounding observations of the child, tests administered and results, and summaries of interviews with project staff were reported, as appropriate.

The results reported herein are based on a sample size of 141 children from 31 HCEEP model projects who were both pretested with the CEEDI and whose handicap was assessed by Verifying Psychologists.

The results are presented in two parts. The first part describes data related to handicapping condition as determined by the Verifying Psychologists and the HCEEP projects. The second part describes services needed and provided to the sample of children.

## Handicapping Condition

Primary handicap. As a result of the verification task, the sample of children were assigned a primary handicapping condition category, or were judged as not handicapped by the Verifying Psychologists. The primary handicapping condition assigned to each child by the psychologists, rather than the handicapping condition category assigned by the HCEEP project, was used for all subsequent analyses related to child growth.

The distribution of the primary handicapping conditions of the sample of children assigned by the psychologists and as reported by HCEEP projects is shown in Table 11. The categories most frequently represented in the sample, regardless of who assigned the category, were speech impairment and learning disability. Vision impaired and crippled were least frequently represented.

The underlined entries in the diagonal cells reflect agreement in assignment of primary handicapping condition by the psychologists and the HCEEP projects. Agreement was obtained for 109 of the 141 children (77.3 percent). A discrepancy in assignment is indicated in 32 cases across all categories of handicapping condition. Agreement between psychologists and projects ranged from 0.0 percent (involving one vision impaired child) to 93.3 percent (for 14 of 15 trainable mentally retarded children). One similar group of discrepancies involves the three categories of learning disability, emotionally disturbed, and speech impaired. The first two categories are considered by many to be two aspects of the same problem concerned with learning difficulties. Speech impairment, on the other hand, may be manifested as a result of the other handicaps or be one area of deficit associated with another handicap. Thus, differences in assignment within this group of categories may be a matter of emphasis by the diagnostician.

A second group of discrepancies concerns the hearing impaired. There is generally high correspondence between psychologists and projects, although three children judged as hard-of-hearing by projects were judged to be deaf by the psychologists. A third group, involving only a small number of children, was concerned with the categories of "crippled" and "other health impaired". Here again, the similarity of symptoms could account for the discrepancy in judgments.

It should be noted that there were no discrepancies relating to whether or not a mentally retarded child was at the educable or trainable level. However, nine children categorized as speech impaired, learning disabled, or other health impaired by projects were judged as mentally retarded by psychologists. The frequency of speech and learning problems among mentally retarded children may account for differences in the diagnosis between psychologists and projects.

TABLE 11. DISTRIBUTION OF PRIMARY HANDICAPPING CONDITIONS AS JUDGED BY VERIFYING PSYCHOLOGISTS AND HCEEP PROJECTS (N=141)

| CATEGORY OF HANDICAPPING CONDITION ASSIGNED BY VERIFYING PSYCHOLOGIST | CATEGORY OF HANDICAPPING CONDITION ASSIGNED BY HCEEP PROJECTS | | | | | | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N.H. | EMR | TMR | LD | ED | SI | DEAF | HOH | VI | CRIP. | OHI | |
| NOT HANDICAPPED | 5 | | | 1 | 1 | 3 | | | | | | 10 |
| EDUCABLE MENTALLY RETARDED | | 12 | | 2 | | 5 | | | | | 1 | 20 |
| TRAINABLE MENTALLY RETARDED | | | 14 | | | 1 | | | | | | 15 |
| LEARNING DISABLED | 2 | | | 24 | | | | | | 1 | | 27 |
| EMOTIONALLY DISTURBED | | 1 | | 3 | 12 | 2 | | | | | | 18 |
| SPEECH IMPAIRED | | | | 1 | 2 | 25 | | | | | | 28 |
| DEAF | | | | | | | 9 | 3 | | | | 12 |
| HARD-OF-HEARING | | | | | | | | 3 | | | | 3 |
| VISUALLY IMPAIRED | | | | | | 1 | | | | | | 1 |
| CRIPPLED | | | | 1 | | | | | | 2 | | 3 |
| OTHER HEALTH IMPAIRED | | | | | | | | | | 1 | 3 | 4 |
| TOTAL | 7 | 13 | 14 | 32 | 15 | 37 | 9 | 6 | 0 | 4 | 4 | 141 |

N=141

In Agreement = 109

Discrepancy = 32

Some discrepancies cannot readily be accounted for by similarity or close relationship of symptoms or handicaps. For example, one child considered speech impaired by a project is judged as visually impaired by the psychologist. This difference can probably be accounted for on the basis of which condition was judged to be primary and which was secondary. In this case, the child evidenced both handicaps. However, the psychologist and project did not agree as to which was primary, i.e., the most debilitating or disabling to the child in terms of functioning in an educational setting.

It should be noted that 10 children (7.0 percent) were judged by psychologists as not handicapped. In 5 cases, the project assignment agreed with this judgment. This does not mean that the children involved did not have special needs. Rather they were described by the HCEEP projects as "economically disadvantaged", "culturally deprived", etc.,--categories not included as handicaps by BEH. In the remaining 5 cases, projects judged the children to be speech impaired, learning disabled, or emotionally disturbed. The Verifying Psychologists did not judge these 5 children to be sufficiently impaired to justify assignment of a handicapping condition.

Multiple handicaps. To more adequately describe the characteristics of the sample of 141 children, it is necessary to determine the severity of disability. Not only the type of handicap, but the number of handicapping conditions will influence the resources needed for a child as well as the growth or progress that can be reasonably expected. Verifying Psychologists reported handicaps which they considered to be secondary, in addition to the primary or most debilitating condition. Results show that 33 of the 131 children judged as handicapped by psychologists (25.1 percent) were judged to have only one, the primary, handicap. Sixty-three children (48.0 percent) had one additional, secondary handicap; 27 children (20.6 percent) had two additional handicaps; 5 (3.8 percent) had three; 2 (1.5 percent) had four; and 1 child (0.7 percent) was reported to have five handicaps in addition to the primary one.

Table 12summarizes the nature of the secondary handicaps associated with each primary handicap as judged by the Verifying Psychologists. Overall, speech impairment was the most common secondary handicap. It was reported in 38 cases. The information from Table 12 supports the belief that discrepancies between psychologists and projects regarding primary handicaps (Table 11) reflect a difference in emphasis as to which condition was primary or most debilitating, and which was less debilitating. Again, groups of handicaps appear that might be expected to occur together commonly. The first such group involves learning disability, emotional disturbance, and speech impairment. The two categories in this group are often closely related, leading to some difficulty in determining which is the cause or the symptom. The second group involves mental retardation and speech impairment. Speech impairment alone may be mistakenly considered as an indication of mental retardation. Or, the speech problem may be considered as one of several characteristics often found among mentally retarded children.

## Assessing Service Needs

The Verifying Psychologists, in addition to diagnosing the handicapping conditions of the sample of children, determined the needs for services of each child and the services being provided by the HCEEP projects to each child to meet these needs. The services considered were:

- Food
- Dental
- Diagnostic and/or Evaluative
- Medical
- Speech Therapy
- Occupational Therapy
- Physical Therapy
- Vision Therapy
- Speech and Hearing Therapy
- Social

TABLE 12. NATURE OF SECONDARY HANDICAPPING CONDITIONS ASSOCIATED WITH PRIMARY HANDICAPS, FOR SAMPLE OF HCEEP PROJECT CHILDREN, AS JUDGED BY VERIFYING PSYCHOLOGISTS (N=131)

| PRIMARY HANDICAP | NO SECONDARY HANDICAPS | NO. OF CASES WITH SECONDARY HANDICAPS OF | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | EMR | TMR | LD | ED | SI | DEAF | HOH | VI | CR. | OHI |
| EDUCABLE MENTALLY RETARDED (EMR) | 2 | | | 1* | 1 | 10 | | 2 | 4 | | 2 |
| TRAINABLE MENTALLY RETARDED (TMR) | 2 | | | | | 7 | | 1 | 1 | | 2 |
| LEARNING DISABLED (LD) | 12 | 2* | | | 4 | 5 | 1 | | 1 | 1 | |
| EMOTIONALLY DISTURBED (ED) | 7 | 2 | | 3 | 1 | 5 | | | | | |
| SPEECH IMPAIRED (SI) | 8 | 2 | | 5 | 4 | | | 3 | | | 2 |
| DEAF | 1 | | | | 1 | 7 | | 1 | | | |
| HARD-OF-HEARING (HOH) | | 2 | | | | 3 | | | | | |
| VISUALLY IMPAIRED (VI) | | | | | 1 | | | | | | |
| CRIPPLED (CR.) | 1 | | 1 | 1 | 1 | | | 1 | 1 | | |
| OTHER HEALTH IMPAIRED (OHI) | | | 2 | 2 | 1 | 1 | | | | | |
| TOTAL | 33 | 8 | 3 | 12 | 14 | 38 | 1 | 8 | 7 | 1 | 6 |

* In some states the definitions of learning disability and educable mentally retardation are not mutually exclusive. It is expected that this is the situation for these three cases.

- Counseling/Guidance
- Recreational
- Educational
- Transportation
- Other.

The services judged as needed by the majority of the 141 children are: diagnostic/evaluative (102 children), speech therapy (85 children), social (93 children), and educational services (109 children). With the exception of speech therapy, these services are provided to 90 percent or more of the children needing the services by the HCEEP projects. Although lower in percentage speech therapy is provided to 80 percent of the needy children.

An interesting finding is that not all of the children in the sample were judged by the psychologists to need educational services (77.3 percent were judged to need this service). It might be reasoned that regular, rather that special, educational services would fulfill the needs of 22.7 percent of the children.

A breakdown of needed services per child showed that 57.9 percent of the children were judged to need from two to six services each, with another 10.5 percent needing nine or ten different services. Two children were judged to need no services.

The percentage of cases receiving needed services ranged from 69.2 percent for occupational therapy to 97.2 percent for educational services. Ten services of 15 service categories are being provided to 80.0 percent or more of the needed cases. A breakdown of services being received per child showed that only six children were not being provided any services, and four were being provided only one service. Two to six services were being provided to 59.3 percent of the children. In addition, the results indicated that few children who do not need a service actually received them. The most frequently provided service that was judged as not needed was food service; only 4.1 percent of the cases received it.

## FOLLOW-UP OF GRADUATES

This task was concerned with the outcome of HCEEP placement and intervention. Efforts were directed toward answering the questions (1) "What happens to children when they leave an early childhood program?" and (2) "What effect does HCEEP experience have on participants in comparison with peers not sharing this experience?"

Two types of data were gathered from 32 HCEEP projects. The first type summarized placement of all "graduates" of the 32 projects between May and August 1974. The second type provided more in-depth information on a sample of the total number of those graduates.

### Placement of All Graduates

Data obtained from the HCEEP Student Follow-Up Data Form-Part I revealed that 755 children left or were graduated from the 32 HCEEP probjects between May and August, 1974. Of these 755, placement was known for 688 children, or 91.1 percent. The graduates were fairly evenly distributed among the three main types of settings: special education classes or programs (34.7 percent), regular classes or programs ith ancillary services (32.7 percent), and regular classes or programs without ancillary services (31.2). Overall, approximately 75 percent of the placements were in the public school settings.

### Placement of Graduates Followed-Up

Characteristics of sample. From the total of 688 children for which placement was known, a sample of 95 was selected for more in-depth follow-up. The ages of the majority of the 95 "graduates" sampled were between 5 and 8 years old: 15.8 percent were 5-6, 29.5 percent were 6-7, and 27.3 percent were 7-8 years of age.

The handicaps of graduates placed most frequently reported were: learning disability (13.7 percent), trainable mental retardation, and deaf (12.6 percent each). A non-specified "other" handicapping condition category represented 21.0 percent of the graduates followed up. Analysis of this category indicates that the following conditions were included: language/communication delay, developmental delay, exceptional emotional needs, personnal-social maladjustment, high risk/low birth weight, and neurologically impaired.

Seventy percent of the graduates had spent at least seven months in HCEEP programs, with most (33.7 percent) being enrolled for 7 to 12 months. A little over 40 percent of the graudates had attended for more than one year, and 15.8 percent attended for more than two years.

Characteristics of Teachers/Therapists of Graduates. The 95 present placement setting teachers/therapists of the HCEEP graduates were interviewed to obtain more in-depth information. The following describes the distribution of teacher/therapist characteristics: 46.3 percent were regular classroom teachers, 46.3 percent were special education classroom teachers, and 6.3 percent were resource teachers or supportive staff. There was one (1.1 percent) "no response" on this item.

Extent of follow-up assistance given by the HCEEP projects to placement settings. Teachers/therapists of graduates were asked about the need for and satisfaction with services from the HCEEP projects. Forty-eight of the 95 teachers/therapists at placement settings (50.5 percent) indicated that follow-up assistance was available from the HCEEPs, 40 (42.1 percent) stated it was not available, and 7 (7.4 percent) were not able to respond to this item. Of the 40 teachers/therapists/stating that assistance was not available, 17 indicated that assistance was needed.

In the majority of cases (60.0 percent), the HCEEP staff initiated contacts, while for 18.2 percent the request came from the placement setting. In 20.0 percent of the cases the staff from the two programs already had a mutual working relationship, or a third party initiated a request.

The teachers/therapists provided 114 responses to the item reflecting the form of assistance provided to them by the HCEEP projects. The most frequent type of assistance was simply general information about the children and/or family background--information routinely found in most children's record folder. Suggested classroom or behavior management techniques and suggested teaching activities or materials were less frequently mentioned (16.7 and 14.9 percent, respectively). Demonstration teaching and inservice training were infrequently provided forms of assistance (1.7 percent each). An "other" category was mentioned by 35.1 percent of the respondents. This category included: observation of child and discussion of his/her progress, discussion of staffing, provision of special services (e.g., physical therapy, tutoring) or materials, and assistance with parental involvement.

Teachers/therapists were generally satisfifed with assistance provided to them: 60.0 percent stated they were "very satisfied", and 25.5 percent were somewhat satisfied.

Appropriateness of placement of graduates. Teachers/therapists were asked to judge the appropriateness of the graduates' placement. Eighty-five of the 95 respondents (89.4 percent) judged the placements to be appropriate. The primary basis upon which this judgment was made was the appropriateness of the developmental level of the "graduate" in relation to other children in the placement class or setting. Chronological age and grouping with children with similar handicaps and/or special needs were factors less often mentioned in considering placement appropriateness. Two factors mentioned in judging placement settings to be inappropriate were the difference between the developmental age of the graduate and other children in the setting, and lack of supportive services.

Present status of followed-up graduates in terms of cognitive skills and social skills. Teachers/therapists were asked to report the status of the graduates' social skills relative to: (1) non-handicapped children, and (2) peers with a similar handicap who did not have an HCEEP experience. Table 13 summarizes the results of the above items. Compared with non-handicapped children, responding teachers/therapists judged a total of 47.2 percent of the graduates to be more advanced (6.5 percent) or at about the same level socially (40.7 percent), and 52.6 percent less advanced. Examination of responses by handicapping condition indicates that the graduates who were trainable mentally retarded, multiply handicapped, or learning disabled made up about one-half of the cases judged as less advanced socially.

Table 13 shows a noticeable difference, however, when the graduates were compared with peers who had a similar handicap. A total of 70.7 percent were more advanced or at the same level socially, with 41.5 percent in the "more advanced" category. Only 29.2 percent were judged as less advanced. Examination of responses associated with specific handicaps shows a marked shift from judgments of "less advanced" to "about the same level" for trainable mentally retarded, and a general shift toward "more advanced" for learning disabled, speech impaired, and multiply handicapped.

In addition to making judgments regarding social skills of graduates compared with non-handicapped and with similarly handicapped peers, teachers/therapists were similarly asked about cognitive skills. Table 14 summarizes the results of these comparisons. Comparable with social skills, responding teachers/therapists judged a total of 42.3 percent of the graduates to be more advanced (5.4 percent) or at about the same level as (36.9 percent) non-handicapped children. Over one-half (57.5 percent) were judged less advanced. Examination of specific handicapping conditions indicates that, as with social skills, about half of the graduates judged as less advanced were trainable mentally retarded, learning disabled or multiply handicapped.

TABLE 13. SOCIAL DEVELOPMENT OF HANDICAPPED FOLLOWED-UP GRADUATES* COMPARED WITH NON-HANDICAPPED CHILDREN, AND WITH PEERS WITH A SIMILAR HANDICAP

| Compared With | ** N | No. (Percentage) Judged | | |
|---|---|---|---|---|
| | | More Advanced | About the Same Level | Less Advanced |
| Non-handicapped | 76 | 5(6.5) | 31(40.7) | 40(52.6) |
| Peers with a Similar Handicap | 65 | 27(41.5) | 19(29.2) | 19(29.2) |

* This includes only the children whom both the HCEEP projects and the placement settings considered to be handicapped.

** N varies, since for each of the two groups, different numbers of teachers/therapists were unable to respond because they had no basis for comparison.

TABLE 14. COGNITIVE DEVELOPMENT OF HANDICAPPED FOLLOWED-UP GRADUATES* COMPARED WITH NON-HANDICAPPED CHILDREN, AND WITH PEERS WITH A SIMILAR HANDICAP

| Compared With | N** | Percentage Judged | | |
|---|---|---|---|---|
| | | More Advanced | About the Same Level | Less Advanced |
| Non-handicapped | 73 | 4 (5.4) | 27 (36.9) | 42 (57.5) |
| Peers With a Similar Handicap | 64 | 37 (57.8) | 12 (18.7) | 15 (23.4) |

* This includes only the children whom both the HCEEP projects and the placement settings considered to be handicapped.

** N varies, since for each of the two groups, different numbers of teachers/therapists were unable to respond because they had no basis for comparison.

When compared with similarly handicapped peers who had no HCEEP experience, judgment of graduates' cognitive skills toward the "more advanced" category. In such a comparison, a total of 76.5 percent were judged as more advanced (57.8 percent) or at the same level as (18.7 percent) similarly handicapped peers. Noticeable percentages increases in the "more advanced" category were observed for the handicaps of trainable mentally retardation, deafness, and "other" handicapping conditions.

Degree of interest of parents of HCEEP graduates compared with parents of other handicapped or non-handicapped children. To obtain some relative measure of parental interest, teachers/therapists were asked to compare graduates' parents with parents of other handicapped children and of non-handicapped children. Table 15 displays the results. For the 10 graduates judged non-handicapped by the placement setting, 50.0 percent of the parents were rated as having about the same interest level as parents of other children while 40.0 percent showed more interest. Only 10.0 percent showed less interest.

When the parents of 85 graduates were compared with parents of other handicapped children, 37.6 percent were judged as having more interest, 25.9 percent as having about the same interest, and 15.3 percent as less interested. The remaining responses, 21.1 percent, were not applicable because there was no basis for comparison, the children had no parents, etc. When compared with parents of non-handicapped children, a slightly higher proportion of graduates' parents tended to show more interest. However, for this comparison, a higher percentage of responses were not applicable, thus making any conclusions tenuous.

TABLE 15. PARENTAL INTEREST IN HCEEP GRADUATES' PROGRESS AND SCHOOL ACTIVITIES (N=95)

| | FOR CHILDREN JUDGED NON-HANDICAPPED BY PLACEMENT SETTING (N=10) | | | FOR CHILDREN JUDGED HANDICAPPED BY PLACEMENT SETTING (N=85) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PARENT INTEREST COMPARED WITH PARENTS OF OTHER CHILDREN | | | PARENT INTEREST COMPARED WITH PARENTS OF OTHER HANCICAPPED CHILDREN | | | | PARENT INTEREST COMPARED WITH PARENTS OF NON-HANDICAPPED CHILDREN | | | |
| | More Interest | Same Interest | Less Interest | More Interest | Same Interest | Less Interest | Not Applicable | More Interest | Same Interest | Less Interest | Not Applicable |
| | 1 | 2 | 3 | 1 | 2 | 3 | | 1 | 2 | 3 | |
| FREQUENCY | 4 | 5 | 1 | 32 | 22 | 13 | 18 | 37 | 14 | 11 | 23 |
| PERCENTAGE | 40.0 | 50.0 | 10.0 | 37.7 | 25.9 | 15.3 | 21.2 | 43.5 | 16.5 | 12.9 | 27.0 |

* The "Not Applicable" category includes cases where there was no basis for comparison, children had no parents, or no response was given.

## PARENT SURVEY

Regulations for HCEEP projects require inclusion of a parent-family participation component. The following types of services are recommended in the regulations: assistance in understanding and coping with the child's handicap; psychological or social work services; information on child growth and development; information on special education techniques; observation of children; carry-over activities to the home; and opportunity to participate in planning and evaluation of the program.

In this section, results of personal interviews of parents of HCEEP project children relating to these types of involvement are reported. In addition, information on attitudes and indications of satisfaction are presented. The data presented are based on the interview responses of 129 parents whose children had been in one of the 32 model projects for one school year and had been pre- and posttested with the CEEDI.

### Parent-Family Involvement in Program Operation

Of the 129 parents responding, 100 (77.5 percent) reported that the project staff had prescribed activities for them to do with their children at home. Table 16 indicates the extent and nature of these activities. The greatest emphasis was on development of language and communication skills (58.1 percent of parents). This skill area was followed, in decreasing emphasis, by motor skills, self-help skills, problem solving skills, and attention skills. Activities concerned with developing social relationships were prescribed least, with only about 2 to 5 percent of the parents reporting the prescription of these activities.

TABLE 16. EXTENT OF AT-HOME LEARNING ACTIVITIES PRESCRIBED BY HCEEP MODEL PROJECTS, AS REPORTED BY PARENTS (N=100)

| SKILL AREA | NUMBER (%)* OF PARENTS REPORTING |
|---|---|
| Language/Communication | 75 (58.1) |
| Motor | 54 (41.9) |
| Self-help | 30 (23.3) |
| Problem-solving, Cognitive | 22 (17.1) |
| Attention | 20 (15.5) |
| Relationships With Other Children | 6 (4.7) |
| Relationships With Family Members | 4 (3.1) |
| Relationships With Other Adults | 3 (2.3) |

* Multiple responses; percent does not equal 100.

Of the 100 parents reporting that activities were prescribed, 96 percent reported that they carried out the activities with their children. Of the 96 carrying out activities, the majority, 65 (67.7 percent), did this daily, while 17 (17.7 percent) worked with the child at least once a week. The remaining parents reported doing such activities less frequently or as needed. Nearly all participating parents (97 percent) indicated that the HCEEP project had provided the support, i.e., instructions, materials, etc., needed to carry out the activities.

In addition to carrying out project-prescribed activities with their own children, 85 percent of the parents were also involved in other ways with the project. Table 17 summarizes the extent of parent involvement in the various activities. The most frequent type of participation was in parent group activities (50.4 percent). The next most frequent types of participation were those wherein parents and children directly benefit. Four percent or less of the parents sampled were involved in program planning or operation activities.

TABLE 17. NATURE AND EXTENT OF PARENTAL INVOLVEMENT WITH HCEEP MODEL PROJECTS (N=129)

| INVOLVEMENT OR ACTIVITY | NUMBER (%)* OF PARENTS REPORTING |
|---|---|
| Parent groups | 65 (50.4) |
| Meetings with project staff | 48 (37.2) |
| Learning activities for parents | 25 (19.4) |
| Assisting teachers with children | 20 (15.5) |
| Planning policy-making | 5 (3.9) |
| Disseminating information | 5 (3.9) |
| Assisting in administration | 2 (1.6) |
| Evaluating program | 1 (0.8) |
| Did not participate | 19 (14.7) |

* Multiple responses; percent does not equal 100.

Fifty-seven interviewed parents (most of whom were the mothers) indicated that other family members or care-givers had also participated in the HCEEP model projects' programs. Of these other family members participating, 15 were siblings, 9 were grandparents, and 5 were some other relative.

Across all 129 parents, 89.6 percent felt that there was enough opportunity for them to participate in the program. Only four percent stated there was not enough opportunity; 6.4 percent did not know.

Overall, most of the parents sampled (95.3 percent) felt that there was generally good communication between themselves and the project staff concerning the needs and problems of the children involved. Similarly, most parents (91.9 percent) indicated that they had been given the opportunity to express their feelings and suggestions about the program and their children's activities.

Parent Perception of Program Effect

The 129 parents of children assessed with the CEEDI were asked if they thought their children had made any improvements or shown any positive change since entering the program. Approximately 97 percent (124) said that they had perceived such changes. Table 18 describes the nature of the parent-perceived changes. All categories of skill areas were mentioned by at least 18.5 percent of the parents. Improvements in language and communication were the most noticed, with 79.8 percent of the parents naming that skill category. Cognitive and problem-solving skills as well as social relationships with other adults were less frequently mentioned. It is of interest that while relatively few parents reported prescribed activities in the areas of social skills (see Table 16), a significantly greater proportion perceived positive changes in these skill areas, particularly in relationships of their children with other children.

TABLE 18. POSITIVE CHANGES IN CHILD BEHAVIOR AS PERCEIVED BY PARENTS (N=124)

| SKILL AREA | NUMBER (%)* OF PARENTS REPORTING |
|---|---|
| Language, Communication | 99 (79.8) |
| Motor | 62 (50.0) |
| Attention | 52 (41.9) |
| Self-help | 48 (38.7) |
| Relationship With Other Children | 46 (37.0) |
| Relationship With Family Members | 27 (21.7) |
| Relationship With Other Adults | 23 (18.5) |
| Problem-solving, Cognition | 23 (18.5) |

* Multiple responses, percent does not equal 100.

Parents were asked if they felt that the reported changes could be attributed to children's participation in the HCEEP programs. An overwhelming proportion (97.6 percent) said yes, and 2.4 percent did not know.

In addition to asking parents about effects the program had on children, parents were also asked if they, the parents, had personally gained anything from participation in this program. Approximately 80 percent (103) replied that they had in one or more ways. The most frequently mentioned benefit was knowledge of how to work with their children (83.4 percent). The next most frequently cited were knowledge of children's problems and needs (57.2 percent) and of children's abilities (42.7 percent).

Interview items specifically inquired about parental expectations regarding their children, and the role the HCEEP projects played in influencing the child's future. First, parents were asked if the programs helped them in forming realistic expectations for their children's future. Of 129 parents, approximately 66 percent replied that it had, 26 percent said it had not, and 8 percent did not know or couldn't say. Parents were also asked if they thought their children's participation in the programs would improve their opportunities for schooling, employment and full social life. Approximately 84 percent answered yes, 4 percent no, and 12 percent did not know or could not say.

Parental Satisfaction

Parents were asked about their satisfaction/dissatisfaction with program services, staff, and facilities. The overwhelming majority expressed satisfaction with these aspects. Approximately 97 percent (124) were satisfied with services their children received and 87 percent with facilities and equipment. Ninety-seven percent felt that all or most of the project staff were well-qualified to work with their children.

When asked if there were any ways in which the projects might change to serve children better, 46 parents (36 percent) replied that there were. Analysis of the suggestions offered, however, indicates that most had to do with the amount of present services, rather than what the services were or how the project operated. That is, suggestions frequently included more contact hours, more speech therapists to deliver services, expanded service to other handicapping conditions, addition of a summer program, etc. In addition to the above suggestions, the following comments were made by one or two parents each: need for more homogenous grouping and more individualized attention; need for an underlying philosophy rather than trying to be everything to every child; more openness to staff to provide child progress information that was previously refused to parent; and need for transportation.

The parental perceptions of program effectiveness are summarized by responses to interview items on program success. Overall, 82.7 percent (107) of the parents felt that the project was very successful in meeting their children's needs, 11.0 percent felt they were somewhat successful, and 6.3 percent were not sure. No parents felt projects were unsuccessful in that regard.

## HCEEP PROGRAM IMPACT

This discussion presents the results of some analyses performed in order to provide a basis for the evaluation of HCEEP projects, based upon a random sample of 32 projects.

### Program Impact on Child Growth

The results of the analysis of child growth are directed at determining whether there was a positive impact - attributable to the HCEEP projects and not maturation - on the growth of handicapped children on the five CEEDI domain scales. The question of program impact is first addressed in an overall sense for the sample of 130 children, randomly selected from the 32 sample projects, who were both pre- and posttested on the CEEDI.

### Characteristics of the Sample

Before presenting the various analyses of program impact, it is important to characterize the sample of children involved in these analyses. Generalizations of analysis results should be restricted to similar children.

The distribution of males and females in the sample was typical of most other random samples of handicapped children. There were almost twice as many males as females. Of the 130 children, 64 percent were male and 36 percent were female. The age at pretesting and posttesting of these children is shown in Table 19. At pretesting, most children (87 percent) were between 2 and 5 years old. Only 9 percent were less than 2 years old and only 4 percent were 6 years old. At posttesting, most children (87 percent) were between 3 and 6 years old. Only 11 percent were less than 3 years old and only 2 percent were 7 years old.

TABLE 19. DISTRIBUTION OF CHILDREN'S AGE AT PRETESTING AND POSTTESTING IN YEARS

| Age in Years | Pretesting Frequency | Pretesting Percent | Posttesting Frequency | Posttesting Percent |
|---|---|---|---|---|
| Less than 1 | 3 | 2.3 | 1 | 0.8 |
| 1 | 9 | 6.9 | 9 | 6.9 |
| 2 | 12 | 9.2 | 5 | 3.8 |
| 3 | 32 | 24.6 | 24 | 18.5 |
| 4 | 41 | 31.5 | 43 | 33.1 |
| 5 | 28 | 21.5 | 35 | 26.9 |
| 6 | 5 | 3.8 | 11 | 8.5 |
| 7 | | | 2 | 1.5 |
| Totals | 130 | 100.0 | 130 | 100.0 |

The primary handicapping conditions of the children in the sample, as judged by the verifying psychologists, are summarized in Table 20. Most of the children (88 percent) fell into six categories: Educable Mentally Retarded, Trainable Mentally Retarded, Learning Disabled, Emotionally Disturbed, Speech Impaired, and Deaf. Note that the relative incidence of Hard of Hearing, Visually Impaired, Crippled, and Other Health Impaired handicapping conditions was very low. Generalizations of the results of the analysis of program impact on child growth should be done with extreme restraint for these categories.

Overall Program Impact

Table 20 presents the raw score pre-post mean gains for each of the five CEEDI domains. Also shown in the table are the pretest and posttest means, standard deviation, and sample sizes, for each domain.

TABLE 20. DISTRIBUTION OF CHILDREN'S PRIMARY HANDICAPPING CONDITION

| Primary Handicap | Frequency | Percent |
|---|---|---|
| Educable Mentally Retarded | 17 | 14.0 |
| Trainable Mentally Retarded | 15 | 12.4 |
| Learning Disabled | 22 | 18.2 |
| Emotionally Disturbed | 16 | 13.2 |
| Speech Impaired | 26 | 21.5 |
| Deaf | 10 | 8.3 |
| Hard of Hearing | 2 | 1.7 |
| Visually Impaired | 1 | 0.8 |
| Crippled | 1 | 0.8 |
| Other Health Impaired | 3 | 2.5 |
| Other Special Needs | 8 | 6.6 |
| Totals | 121 | 100.0 |

It should be noted that the actual pre-post gains themselves cannot be taken as evidence of a positive program impact, since these gains not only reflect a possible HCEEP program effect but also an effect due to maturation in the absence of HCEEP project experiences. The two methods of analysis employed (regression analysis and matching), are directed toward assessing what part of this total gain (if any) is due to project experience, or what part might be accounted for on the basis of maturation alone.

TABLE 21. GAIN SCORES AND ASSOCIATED STATISTICS FOR EACH CEEDI DOMAIN

| Domain | Score | Mean | Std. Dev. | Sample Size |
|---|---|---|---|---|
| Personal-Social | Pretest | 39.923 | 19.320 | 130 |
| | Posttest | 51.581 | 20.000 | 129 |
| | Gain | 11.674 | 12.052 | 129 |
| Adaptive | Pretest | 38.969 | 13.596 | 130 |
| | Posttest | 44.898 | 13.273 | 128 |
| | Gain | 6.000 | 7.036 | 128 |
| Cognitive | Pretest | 22.431 | 11.396 | 130 |
| | Posttest | 27.400 | 13.005 | 130 |
| | Gain | 4.969 | 6.311 | 130 |
| Communication | Pretest | 24.783 | 12.966 | 129 |
| | Posttest | 30.380 | 13.803 | 129 |
| | Gain | 5.477 | 6.318 | 128 |
| Motor | Pretest | 46.408 | 15.854 | 130 |
| | Posttest | 52.131 | 16.380 | 130 |
| | Gain | 5.723 | 6.159 | 130 |

Analyses With Age Only. Table 22 shows the results of regression and matching analyses, using age only as the basis for matching, and using the pretest-age regression results to determine expected performance in the absence of project experiences.

For each domain, the first row of the table contains the mean impact score, sample size, and t-statistic* using the regression model. The second row contains analogous data for the sample of children for which an exact age match (in months) could be obtained. Since the sample size was noticably smaller than for the regression results, matching was done again allowing a one-month difference in order to obtain an age match. The results of the inexact age matching are presented in the third row.

* The t-statistic is used to test the hypothesis that the mean impact score is less than or equal to zero. If the value of $t$ is large enough to reflect this hypothesis at the 0.05 level of significance, it is displayed. Otherwise it is not.

TABLE 22. RESULTS OF ESTIMATING AND TESTING OF OVERALL PROGRAM IMPACT USING THE REGRESSION AND MATCHING METHODS - WITH AGE ONLY

| Domain | Method | Mean Impact | Sample Size | t[a] |
|---|---|---|---|---|
| Personal-Social | Regression | 6.702 | 129 | 5.475 |
| | Matching-Exact | 8.506 | 89 | 4.833 |
| | Matching-Inexact[b] | 6.816 | 103 | 3.550 |
| Adaptive | Regression | 2.234 | 128 | 2.647 |
| | Matching-Exact | 3.784 | 88 | 2.722 |
| | Matching-Inexact | 2.500 | 102 | -- |
| Cognitive | Regression | 1.908 | 130 | 2.350 |
| | Matching-Exact | 3.124 | 87 | 2.598 |
| | Matching-Inexact | 1.481 | 104 | -- |
| Communication | Regression | 2.187 | 129 | 2.446 |
| | Matching-Exact | 3.115 | 87 | 2.257 |
| | Matching-Inexact | 1.854 | 103 | -- |
| Motor | Regression | 1.005 | 130 | -- |
| | Matching-Exact | 2.506 | 89 | -- |
| | Matching-Inexact | 1.413 | 104 | -- |

(a) The t-statistic is presented whenever the test is significant at the 0.05 level.

(b) Inexact matching on age considers ages to be matched if they are within one month of each other.

By way of example, the entry 6.702 (mean impact for the Personal-Social domain, using the regression method) means that the average of the actual posttest scores was 6.702 raw score units higher than would be expected in the absence of HCEEP project experiences, thus indicating a positive HCEEP impact for the Personal-Social domain. The value of 6.702 means that the actual mean gain from pretest to posttest (i.e., the gain of 11.674 raw score units, as shown in Table 21), was 6.702 units higher than would be expected by maturation alone in the absence of HCEEP experiences, or that 6.702 units of the actual average gain might reasonably be attributed to HCEEP project experiences, with the balance of the gain (11.674-6.702 = 4.972) being attributable to maturation.

Other mean impact entries in the table are interpreted similarly, including the mean impacts for the matching method.

Examining the various mean impact measures in Table 22, one can see that the exact age matching method yielded slightly higher mean impact scores than did the regression method. However, the results are remarkably alike, especially with regard to the statistical significance of these means. In both cases all domains except the Motor domain had a significant mean. In the case of the inexact age match, the means for each domain are even more similar to the regression method means, probably due to the increase in sample size. However, the inexact matching means were not significant except in the Personal-Social domain. Further examination of these data showed that the matching procedure consistently produced larger variances around the estimated means.

From these results, it is concluded that the two methods produced quite similar results. However, the regression method appeared more powerful, in a statistical sense, probably due to a combination of larger sample sizes and smaller variances around the means.

Analyses With Age and Handicapping Condition. The second way utilized to estimate overall program impact was by first estimating impact for children with the same handicapping condition. This was done because it was believed that a child's handicap could significantly alter the relationship between pretest scores and age.

In the regression method, separate regression lines were used to calculate the expected posttest scores (based on the pretest-age regression) within each handicapping condition before the overall mean was calculated. In the matching method, children were matched on age within handicapping condition (thus yielding children matched on both age and handicapping condition) before calculating the overall mean.

In Table 23, the first row for each domain contains the mean impact, sample size, and t-statistic (whenever significant) for the results of the regression method. The mean impacts (for both the matching and regression analysis) are interpreted in the same way as those previously given for the analyses dealing with age only. For the regression method, the mean impact for each of the five domains was significant. The second row shows the results using an exact age match. Again the means tend to be larger than for the regression method, but fewer are significant, probably due to the very small sample size. When the age match was relaxed to within one month, the Personal-Social mean impact increased noticably, the Adaptive mean impact decreased, and the other three domain mean impacts remained about the same. However, all five means were significant.

From these results, it is again concluded that the two methods of regression and matching produced quite similar results.

Although the mean impacts shown in the previous analyses, which are in raw score units, do not appear very large in several cases, a simple, but informative measure can be calculated to lend meaning to these impacts. Considering only the two regression analyses, which provide probably more stable estimates than the matching analyses, subtracting the mean impacts from the actual raw score gain means (presented earlier in Table 21) yields the expected gain due to maturation. The ratio of the mean raw score gain to the expected gain due to maturation indicates the

TABLE 23. RESULTS OF ESTIMATING AND TESTING OVERALL IMPACT USING THE REGRESSION AND MATCHING METHODS - WITH AGE AND HANDICAPPING CONDITION

| Domain | Method | Mean Impact | Sample Size | t (a) |
|---|---|---|---|---|
| Personal-Social | Regression | 6.541 | 120 | 5.473 |
| | Matching-Exact | 8.741 | 27 | 2.519 |
| | Matching-Inexact (b) | 10.078 | 51 | 3.451 |
| Adaptive | Regression | 2.896 | 119 | 3.892 |
| | Matching-Exact | 7.577 | 26 | 3.946 |
| | Matching-Inexact | 4.560 | 50 | 2.841 |
| Cognitive | Regression | 1.766 | 121 | 2.664 |
| | Matching-Exact | 3.593 | 27 | -- |
| | Matching-Inexact | 2.769 | 52 | 1.688 |
| Communications | Regression | 2.594 | 120 | 3.326 |
| | Matching-Exact | 3.926 | 27 | -- |
| | Matching-Inexact | 3.365 | 52 | 1.708 |
| Motor | Regression | 1.884 | 121 | 2.444 |
| | Matching-Exact | 3.260 | 27 | -- |
| | Matching-Inexact | 3.712 | 52 | 2.133 |

(a) The t-statistic is presented whenever the test is significant at the 0.05 level.

(b) Inexact matching on age considers ages to be matched if they are within one month of each other.

relative growth rate of these children in the presence of the HCEEP projects to that expected in their absence. For example, in the Personal-Social domain for the age only regression analyses, the mean raw gain (from Table 21) was 11.674. The mean program impact was 6.702. The difference, 4.972, is then the expected growth due to maturation. Thus, the ratio, 11.674/4.972=2.348, can be interpreted to mean that the Personal-Social growth of the total sample was over 2.3 times as great in the presence of the projects as would have been expected in their absence. Similar calculations for the other four domains show that this ratio is about 1.6 for each domain except Motor, where it is about 1.2.

The ratio of actual of expected gains is shown for each domain in Table 24, for both the regression analysis with age only and the regression analysis taking into account age and handicapping condition. Inspection of table entries shows that when both age and handicapping condition are taken into account in estimating expected gain due to maturation in the absence of project experiences, that the ratio of actual to expected gains is somewhat higher for the Adaptive, Communication, and Motor areas.

TABLE 24. RATIO OF ACTUAL TO EXPECTED GAINS FOR EACH REGRESSION ANALYSIS

| Analysis Method | CEEDI Domain | | | | |
|---|---|---|---|---|---|
| | PS | AD | CG | CM | MO |
| Age Only Regression | 2.348 | 1.593 | 1.623 | 1.665 | 1.213 |
| Age and Handicapping Condition Regression | 2.268 | 1.904 | 1.593 | 1.889 | 1.467 |

PS = Personal-Social
AD = Adaptive
CG = Cognitive
CM = Communication
MO = Motor

Summary of Overall Impact Analyses. For the "age only" analyses, i.e., where only children's age at posttest was taken into account in estimating expected CEEDI test performance of handicapped children in the absence of project experiences, both the regression and matching methods (when exact age matches were used) show a statistically significant positive program impact for all CEEDI domain scales except the Motor domain.

For the age and handicapping condition analyses, i.e., where both children's age and handicapping condition were taken into account in estimating expected CEEDI test performance in the absence of project experiences, both the regression and matching methods show a statistically significant positive impact in both the Personal-Social and Adaptive domains. In the Cognitive and Communication Domains, the regression analysis shows a statistically significant positive program impact, but exact age matches (within handicapping condition) do not, although the impacts are still positive.

In summary, the various regression and matching analyses point toward one conclusion: a positive HCEEP program impact in the Personal-Social, Adaptive, Cognitive, and Communication domains. In the Motor domain, there may be a positive program impact, although results are too mixed to say with assurance.

## Impact for Selected Groupings on Child Variables

In addition to assessing program impact for the total sample of children, a reasonable question to investigate is whether or not there is a significant positive program impact for different types of children. Tables 25 and 26 present the impact results for the different handicapping conditions.

TABLE 25. MEAN PROGRAM IMPACT AND ASSOCIATED STATISTICS BY DOMAIN AND PRIMARY HANDICAPPING CONDITION

| Domain | Primary Handicap (b) | Mean Impact | Sample Size | Standard Deviation (c) | t (a) |
|---|---|---|---|---|---|
| Personal-Social | EMR | 10.512 | 17 | 13.276 | 3.265 |
| | TMR | 5.889 | 15 | 13.977 | -- |
| | LD | 5.220 | 22 | 8.409 | 2.911 |
| | ED | 9.906 | 15 | 14.053 | 2.730 |
| | SI | 5.423 | 26 | 12.914 | 2.141 |
| | HH | 2.997 | 12 | 15.409 | -- |
| | OSN | 14.943 | 8 | 12.380 | 3.414 |
| Adaptive | EMR | 5.148 | 17 | 9.250 | 2.295 |
| | TMR | 3.593 | 15 | 8.934 | -- |
| | LD | 2.409 | 22 | 6.296 | 1.795 |
| | ED | 3.926 | 14 | 10.375 | -- |
| | SI | 3.020 | 26 | 6.363 | 2.420 |
| | HH | 3.365 | 12 | 8.696 | -- |
| | OSN | -2.319 | 8 | 6.607 | -- |
| Cognitive | EMR | 3.531 | 17 | 6.097 | 2.387 |
| | TMR | 5.889 | 15 | 5.662 | -- |
| | LD | 1.281 | 22 | 6.194 | -- |
| | ED | 1.661 | 16 | 9.498 | -- |
| | SI | 2.741 | 26 | 9.676 | -- |
| | HH | 0.603 | 12 | 4.885 | -- |
| | OSN | 1.577 | 8 | 4.743 | -- |

(a) The t-statistic is reported whenever the mean is statistically significantly greater than zero ($p \leq 0.05$).

(b) EMR=Educable Mentally Retarded; TMR=Trainable Mentally Retarded; LD=Learning Disabled; ED=Emotionally Disturbed; SI=Speech Impaired; HH=Hard of Hearing and Deaf; and OSN=Other Special Needs.

(c) The standard deviation of the difference scores, $(Y-Y')$, where $Y'$ is the estimated posttest score for an individual in the absence of treatment, based on the pretest-age regression analysis. The standard deviation column in all subsequent tables is interpreted similarly.

TABLE 25. MEAN PROGRAM IMPACT AND ASSOCIATED STATISTICS BY DOMAIN AND PRIMARY HANDICAPPING CONDITION (Continued)

| Domain | Primary Handicap[b] | Mean Impact | Sample Size | Standard Deviation | t[a] |
|---|---|---|---|---|---|
| Communication | EMR | 5.815 | 17 | 9.234 | 2.596 |
| | TMR | 1.722 | 15 | 8.156 | -- |
| | LD | 0.428 | 22 | 6.622 | -- |
| | ED | 5.477 | 16 | 9.406 | 2.330 |
| | SI | 0.034 | 26 | 10.259 | -- |
| | HH | 2.999 | 11 | 5.043 | 2.060 |
| | OSN | 6.786 | 8 | 5.489 | 3.496 |
| Motor | EMR | 2.688 | 17 | 10.275 | -- |
| | TMR | 0.850 | 15 | 11.279 | -- |
| | LD | 0.261 | 22 | 5.373 | -- |
| | ED | 6.474 | 16 | 11.372 | 2.277 |
| | SI | 2.320 | 26 | 6.341 | 1.865 |
| | HH | 0.164 | 12 | 5.705 | -- |
| | OSN | -0.411 | 8 | 4.617 | -- |

(a) The t-statistic is reported whenever the mean is statistically significantly greater than zero ($p \leq 0.05$).

(b) EMR=Educable Mentally Retarded; TMR=Trainable Mentally Retarded; LD=Learning Disabled; ED=Emotionally Disturbed; SI=Speech Impaired; HH=Hard of Hearing and Deaf; and OSN=Other Special Needs.

Table 25 provides the mean program impact and associated statistics (based on the age-pretest regression analysis) for the seven handicapping categories examined for each CEEDI domain. With two exceptions, involving the Other Special Needs children, all impact estimates were positive. EMR children demonstrated a significant impact for all domains except Motor. Emotionally Disturbed children showed a significant impact in three domains: Personal-Social, Communication, and Motor, as did the Speech Impaired: Personal-Social, Adaptive, and Motor. The Learning Disabled and Other Special Needs groups had two significant impacts--the former in Personal-Social and Adaptive and the latter in Personal-Social and Communication. The Hard of Hearing/Deaf group had only one significant impact, in Communication. There were no significant impacts for the TMR children despite three noticeable large impacts in the first three domains.

Across all handicap groups and domains, 15 of the 35 estimated impacts were significant. The most frequently impacted group were the EMR children and, curiously, the least frequently impacted were the TMR children. Looking at each domain, the Personal-Social domain contained the largest number of significant impacts (5) and the Cognitive domain the least number of significant impacts (1). In summary, it appears that the HCEEP projects are doing the best job in the Personal-Social area and with EMR children, according to the tests of significance.

Table 26 provides a summary of program impact for each handicapping condition, and also shows the ratio of actual to expected gains for each CEEDI domain within each handicapping condition. For a given handicapping condition, the first row (labeled "effect") shows the mean impact for each domain, i.e., the actual pre-post gain expected on the basis of maturation in the absence of project experiences. All statistically significant program impacts are indicated with an asterisk. The second row (labeled "gain") shows the actual pre-post mean gain. The third row (labeled "ex. gain") shows the gain expected in the absence of project experiences. The underlined entries in each cell of the table show the ratio of actual mean gains to expected mean gains. The "Other Special Needs" group is omitted, due to the uncertain type (if any) of handicapping condition represented by these children.

TABLE 26. SUMMARY OF PROGRAM IMPACT FOR EACH HANDICAPPING CONDITION

| Handicapping Condition | Measure | CEEDI DOMAIN PS | | AD | | CG | | CM | | MO | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EMR | Effect | 10.5* | | 5.1* | | 3.5* | | 5.8* | | 2.7 | |
| | Gain | 14.0 | 4.0 | 8.5 | 2.5 | 5.7 | 2.6 | 7.9 | 3.7 | 7.4 | 1.6 |
| | Ex. Gain | 3.5 | | 3.4 | | 2.2 | | 2.1 | | 4.7 | |
| TMR | Effect | 5.9 | | 3.6 | | 0.2 | | 1.7 | | 0.9 | |
| | Gain | 9.0 | 2.9 | 6.0 | 2.5 | 1.4 | 1.1 | 2.7 | 2.7 | 4.2 | 1.3 |
| | Ex. Gain | 3.1 | | 2.4 | | 1.2 | | 1.0 | | 3.4 | |
| LD | Effect | 5.2* | | 2.4* | | 1.3 | | 0.4 | | 0.3 | |
| | Gain | 10.4 | 2.0 | 5.6 | 1.8 | 4.9 | 1.4 | 4.7 | 1.1 | 5.0 | 1.0 |
| | Ex. Gain | 5.2 | | 3.2 | | 3.6 | | 4.3 | | 4.7 | |
| ED | Effect | 9.9* | | 3.9 | | 1.7 | | 5.5* | | 6.5* | |
| | Gain | 16.0 | 2.6 | 6.8 | 2.4 | 5.2 | 1.5 | 8.6 | 2.7 | 9.8 | 3.0 |
| | Ex. Gain | 6.1 | | 2.9 | | 3.6 | | 3.1 | | 3.3 | |
| SI | Effect | 5.4* | | 3.0* | | 2.7 | | 0.0 | | 2.3* | |
| | Gain | 12.2 | 1.8 | 6.1 | 2.0 | 6.9 | 1.7 | 4.7 | 1.0 | 6.5 | 1.6 |
| | Ex. Gain | 6.8 | | 3.1 | | 4.2 | | 4.6 | | 4.2 | |
| HH | Effect | 3.0 | | 3.4 | | 0.6 | | 3.0* | | 0.2 | |
| | Gain | 9.3 | 1.5 | 6.9 | 1.9 | 2.8 | 1.3 | 3.8 | 4.7 | 3.9 | 1.0 |
| | Ex. Gain | 6.3 | | 3.6 | | 2.1 | | 0.8 | | 3.8 | |

* Program impact (effect) statistically significant at the .05 level

Inspection of the table shows that the ratio of actual to expected gains is appreciable in several instances, this ratio often being on the order to 1.5 to 2.0. That is, viewing all handicapping conditions and domains, it is not uncommon for children to have gained 1-1/2 to 2 times more (from pre- to posttest) than would have been expected in the absence of project experiences. In several cases (for example, EMR children in the Personal-Social domain), the ratio of actual to expected gains is even larger.